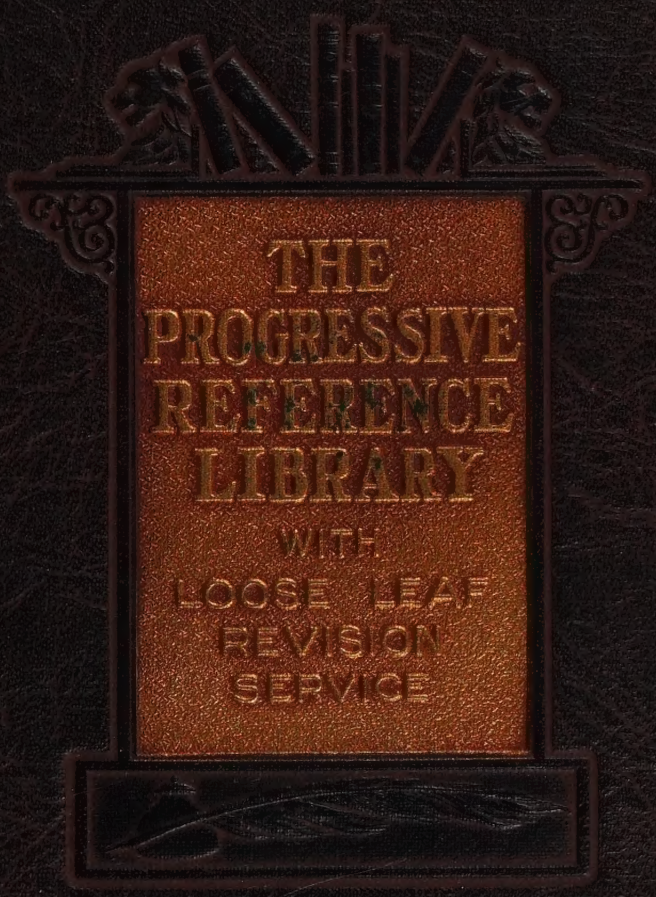
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Sebastian. Later a myth was developed, which ultimately gave rise to many poems and romances. It is still believed by many peasants that Sebastian will yet return to restore his people to their ancient glory.

SEBASTIAN, Saint, noted Christian martyr, born in Narbonne, France, about the middle of the 3d century; suffered martyrdom Jan. 20, 288. He was educated at Milan and entered the Roman army as a captain of the Praetorian guard under Diocletian, though without revealing his religious views. It thus became possible for him to protect the persecuted Christians and to convert the keeper of the prison to Christianity. Later he publicly confessed his faith. Diocletian made a strenuous effort to induce him to renounce the Christian creed, and, finding the task useless, had him condemned to be executed. The archers who were commissioned to execute him left him as dead, but a Christian lady named Irene found that life was not extinct and restored him to health by careful nursing. Soon after recovery, Sebastian again appeared before Diocletian to confess his faith, but the latter ordered that he be beaten to death in the amphitheater and his body to be thrown into the sewer. The Greeks hold his festival on the 20th of December. He has been made the subject of many fine paintings by Italian masters, including Veronese, Mantegna, and Domenichino.

SEBASTOPOL (sē-bȧs'tŏ-pŏl), or **Sevastopol,** a seaport city of Ukrainia, on the Black Sea, in the government of Taurida. It is in the southwestern part of the Crimea and has important railroad connections with Eurasian cities. It has a secure and commodious harbor. Sebastopol is the seat of a large interior and foreign trade, particularly in grain, hides, salt, and manufactures. It is strongly fortified. The harbor is sheltered on the north and south by lofty limestone ridges, and there are ample facilities for the largest vessels to anchor safely on the shore. The allied armies of Turks, French, and English conducted a memorable siege in the Crimean War of 1854-55, and the first bombardment took place on Oct. 17 of the former year. General Todleben defended the land side against the French and English for eleven months, but on Sept. 8, 1855, the Russian evacuation occurred. Population, 1922, 63,240.

SECESSION (sē-sĕsh'ŭn). See **Civil War.**

SECONDARY SCHOOLS, the name given to institutions of learning that are classed between the common schools and the colleges. These schools are intended to prepare pupils for entrance into the institutions of higher learning. The list of these schools in Canada and the United States includes academies, seminaries, and public high schools, and in many cases their courses are such that pupils who graduate from them are entered without examination into colleges and universities. In the United States the high schools are under township or city control, and the academies and seminaries are either managed as private or denominational institutions. Besides college preparatory courses, they usually maintain departments of music, commerce, and manual training. Secondary schools are known in Germany as *Realschulen* and in France as *Lycées.*

SECORD, Laura, heroine, born in Massachusetts in 1775; died Oct. 17, 1868. She was the eldest daughter of Major Thomas Ingersoll, a British loyalist, and in 1795 removed to Canada, where she married James Secord. In 1813 she saved the British force at Beaver Dam under James Fitzgibbon, from defeat by a larger force of Americans, which she did by walking from Queenstown to warn her countrymen, and the 500 Americans who made the attack were compelled to surrender. A monument was erected to her honor at Lundy's Lane.

SECRETARY BIRD (sĕk'rĕ-tȧ-rў), a genus of rapacious birds native to Africa and the Philippine Islands. They are so named from

SECRETARY BIRD.

the fanciful resemblance between the crest, made up of a peculiar plume of long feathers, and pens projecting behind the ears of a clerk. The species native to South Africa is typical and is the best known. The head and neck are long, the height when standing is about four feet, the color is grayish-blue, and the tail is very long. The wings and legs are long. It can fly with facility when it is in the air, but greatly prefers to run. The natives and Europeans of South Africa protect it for its service in killing serpents, on which it feeds. It kills the serpents by inflicting severe injury with its feet and beak, or by dropping them from a high elevation while on the wing. Though sometimes bitten by venomous serpents, it appears to be entirely fearless. Secretary birds

may be domesticated, in which state they serve to protect poultry.

SECRETION (sē-krē'shŭn), the process by which certain matters are separated from others in an organized body and collected at particular places to be employed for special purposes in the system, as the saliva, bile, gastric juice, and mucus. Secretion is performed in animals by organs of various form and structure, but generally by glandular epithelial cells. It appears that neither the form nor internal arrangement of the parts of a gland have any essential connection with the nature of the fluid secreted, the process of secretion being always performed by the intervention of cells, whose office is to elaborate from the blood substances different than the blood. Certain secretions are to be thrown off the system as useless or injurious, as the urine, which are generally called *excretions*. The process of secretion is carried on under stimuli of the system, but it is materially enhanced or suppressed by mental conditions. Secretion of plants is the process of separating certain elements from the sap and elaborating them for particular uses. They are produced in the interior of the plants and are made up largely of those known as nutritious secretions, including sugar, starch, albumen, gum, gluten, and lignin. The special or non-assimilable secretions in plants include coloring matters, alkalies, acids, resinous principles, milks, and many others.

SECRET SERVICE, the department of government which is concerned in the detection of crime and fraud, or to collect information of a private nature for the benefit of a state or nation. In some countries the secret service is a distinct department of the government, and the subordinates transmit reports from time to time either direct or through heads of departments to the chief official in this branch of the service. While valuable services are rendered in discovering those who are disloyal or in breaking up unlawful organizations, the chief purpose is to detect counterfeiters of coins and paper currency and to coöperate in enforcing the revenue laws. Smuggling is another form of crime coming under the attention of the secret service.

SECULAR GAMES (sĕk'ū-lĕr), the name of a class of performances popular in ancient Rome, so named from a *saeculum,* meaning a generation or the extreme duration of human life. Originally these games took place at short intervals, but it was decreed in 249 B. C. that they should be celebrated every 100th year, and Augustus extended the period to 110 years. The purpose was to celebrate in a fitting manner the close of a period during which all who live at the beginning had passed away. Three days were usually given to the games, and it was a part of the festivities to offer animals as sacrifices to Proserpina and Dis Pater, the Greek gods of the lower world. The last celebration took place in 204 A. D., in the time of Septimius Severus.

SEDALIA (sĕ-dā'lĭ-ă), a city of Missouri, county seat of Pettis County, 88 miles southeast of Kansas City, on the Missouri Pacific and the Missouri, Kansas and Texas railroads. It is surrounded by a fertile farming country, which produces cereals, fruits, and grasses. The noteworthy buildings include the county courthouse, the high school, the public library, the Convent of the Sisters of Saint Joseph, the hospital of the Missouri, Kansas and Texas Railroad, and the George R. Smith College. It has Forest and Liberty parks. Among the manufactures are flour, machinery, farming implements, hardware, railway cars, woolen goods, furniture, and boilers. It is improved with electric and gas lighting, public waterworks, substantial pavements, and a sewerage system. Sedalia was founded by Gen. George R. Smith in 1861, was captured by the Confederates in 1864, and was chartered as a city in 1889. Population, 1900, 15,231; in 1920, 21,144.

SEDAN (sĕ-dăn'), a city and fortress of France, in the department of Ardennes, 64 miles northeast of Rheims. It occupies an imposing site on the Meuse River and in its vicinity are extensive deposits of coal and iron. The manufactures include cotton and woolen goods, metal ware, pottery, and laces. Sedan is noted as a military and strategic point. It surrendered to the Germans in 1815 and also on Sept. 2, 1870. In the latter year it was occupied by a French army of 86,000 under Napoleon III. and Marshal MacMahon. The German army under King William laid siege to the city and on Sept. 1 began a vigorous attack, which resulted in the surrender on the following day. Napoleon was sent as a prisoner of war to Wilhelmshöhe, and the republic of France was declared at Paris by Gambetta on Sept. 4. It was again occupied by the Germans in 1914 after an extended attack. The Sedan chair, a portable covered vehicle for carrying a single person, borne on two poles by two men, was invented in and so named from the city of Sedan. The city was captured by the Americans in 1918. Population, 1922, 20,408.

SEDATIVES (sĕd'ă-tĭvz), the name applied to any drugs which have a soothing or quieting effect upon the sensory function, either local or general. Drugs that have a local effect act upon different organs, while those included with the general sedatives influence the entire system. Some drugs are sedatives in their effect upon one or more particular organs, but may influence others as irritants. In some cases these drugs are sedative in small doses, but excite or irritate when taken in large quantities. Ether and chloroform are general sedatives, while opium, aconite, and cocaine are classed as local sedatives. Potassium and sodium soothe the nerves and spinal centers; bismuth and sodium bicarbonate, the stomach; and aconite and digitalis, the circulatory system.

SEDGE (sĕj), the common name of an extensive genus of plants, found mostly in swamps and wet places. They are generally distributed in all the temperate and northern parts of the earth. The stems are without joints, usually triangular, and possess little economic value. This genus of plants embraces the bulrushes and the sedges proper, the latter being species of the genus *Carex*. A species of allied plants was used by the ancient Egyptians in making papyrus paper. The coarse fodder derived from the sedge plant is of no particular value for domestic animals, since only a few species eat it and even those partake of it reluctantly.

SEDGWICK (sĕj'wĭk), **Catherine Maria,** author, born at Stockbridge, Mass., Dec. 28, 1789; died July 31, 1867. She opened a private school for young ladies in 1813, in which she remained a constant worker for fifty years. Her first publication, "A New England Tale," was published in 1822 with the aid of her brother, Theodore Sedgwick. Subsequently she gave her attention largely to literary work. A number of her writings were translated into the leading languages of Europe, including "Redwood," of which many editions were issued. Other books include "Live and Let Live," "Facts and Fancies," "The Linwoods," "Letters to My Pupils," and "Letters from Abroad."

SEDGWICK, John, soldier, born in Cornwall, Conn., Sept. 13, 1813; slain in battle May 9, 1864. He graduated from the West Point Military Academy, in 1837, and soon after served against the Seminoles in Florida. His services were volunteered at the beginning of the Mexican War, in which he rendered valuable aid at Cerro Gordo, Contreras, Churubusco, and Chapultepec. In 1861 he was commissioned brigadier general of volunteers and was assigned to the army of the Potomac. His efficient services in the Battle of Fair Oaks won the day for the Union army, and soon after he bore a conspicuous part at Antietam. He was promoted major general of volunteers in 1862 and fought at Fredericksburg, Chancellorsville, Gettysburg, Rappahannock, and in the Wilderness campaign. His death resulted from a bullet fired by a Confederate sharpshooter while placing guns in the intrenchments at Spottsylvania Courthouse. In 1868 a fine bronze statue was erected at the West Point Military Academy to commemorate him.

SEED, the body produced by the ripened pistils of plants, from which a new plant may spring. It is an ovule fertilized and matured, and has a germ or embryo formed in it. Upon reaching this perfected state, it is separated from the parent plant, and in it are contained all the necessary elements to bring forth a new life similar to the one on which it grew and of which it was a part. It consists of two parts, the *nucleus*, or *kernel,* and the *integuments,* or *coats*. An outer loose covering, generally an imperfect one, is on many plants while the seed is growing, this being called an *aril*. The seed coats proper are commonly two, an outer and an inner; the latter generally is thin and delicate. The outer coat is called the *testa* and the inner is the *tegmen,* or *endopleura,* and the two are known as the *spermoderm*. In some plants the outer coat is close and even, as in the morning-glory, sometimes it has a tuft of long hairs, as in the milkweed, while in others it is covered with long, woolly hairs, as in the cotton plant, which forms the useful cotton of the market. Some seeds have a fringelike wing or tuft at each end, as the catalpa seeds, while the seeds of maples are winged at one end. These tufts and wings are designed to render such seeds buoyant, so they may be dispersed by the wind when ripe. In some plants the seed is borne on a seedstalk. The *scar,* or *hilum,* is the mark where the seed was attached to the plant, this being particularly plain in the bean, pea, chestnut, and buckeye.

The whole body of the seed within the coats forms the *kernel*. It consists of the *embryo* and the *albumen,* though in some plants the latter is wanting. Seed albumen is a stock of prepared food, which is designed to support the embryo in the early stage of growth, but in some seeds a similar supply is laid up in its cotyledons. The embryo is a plantlet in miniature. The development of the embryo depends upon the seed, fruit, and blossom. It is nourished by the albumen of the seed until it secures sufficient vigor to provide for itself. It is protected by the seed coats. The embryo has the *radicle* or *original stemlet,* from one end of which the roots grow downward, and from the other the stem is pushed upward. It also sends forth one or more cotyledons or seed leaves, and often a plumule or bud for continuing the stem upward. Some seeds may be stored and kept a long time, while others begin growth soon after coming in contact with moist soil. Wheat, corn, rye, and other cereals begin to sprout immediately after being placed in a moist and warm soil, while the walnut is protected from growth or early decay until the following spring.

Some seeds require time to dissolve their outer covering before they give rise to a new plant, and in others it is necessary for the store of food to be acted on by the ferments lying within the covering. There is much difference in the length of time that seeds may be kept, even under the best of care. Such seeds as those of the poplar and willow must be brought to moist soil within a few days after ripening, while beans, rye, and wheat may be stored for many years. The seeds of plants supply man and animals with wholesome foods, the more important being wheat, rye, oats, corn, barley, buckwheat, coffee, linseed, mustard, nutmeg, cotton seed, rice, beans, peas, etc. Seeds having one cotyledon are called *monocotyledonous;* those having two, are termed *dicotyledonous;* and the seeds of flowerless or cryptogamic

plants are designated *acotyledonous.* Cryptogams, or flowerless plants, reproduce by means of spores, which are analogous to the seeds of ordinary flowering plants, but they contain no embryo. They are mostly one-celled and generally produce extensively.

A steady and growing demand for seeds of farm grains, fruits, and vegetables has developed in America from the first settlement of the country. It was originally customary for farmers and others to preserve seed supplies from their own production, but later the demand for purer and better seeds sprang up, which caused the development of regular seed farms. The first of these was established in 1784 by David Landreth, near Philadelphia. With the general development of the country and the growth of cities came a demand for better fruit and vegetables than were reared in the commonplace gardens. Many market gardeners were induced to grow seeds to supply the demand of those producing the materials for the city market. This ultimately led to the establishment of farms at which seed production is the principal object.

At present there are about 600 farms in the United States devoted exclusively to seed production. These utilize about 175,500 acres of land and represent a capital of $20,500,000. Besides the regularly established farms, quite a large number of agriculturists produce seeds to supply local dealers or customers within the immediate neighborhood. The seed industry has been the means of a general improvement in the nature of the product and a diversification of the crops produced. The seeds grown in this way comprise practically all species of grasses, grains, fruits, and vegetables. Seed culture is carried on most extensively in New York, California, New Jersey, and Ohio. A demand for northern-grown seeds, especially those of a hardy class of plants, has caused the industry of seed culture to be established in many northern states, particularly in Minnesota, Wisconsin, and Michigan.

SEELAND. See **Zealand.**

SEELEY (sē'lĭ), **John Robert,** historian, born in London, England, in 1834; died Jan. 13, 1895. He studied in the city schools of London and Cambridge University, and after graduating at the latter became one of its fellows. In 1863 he was made professor of Latin in University College, London, and six years later became professor of modern history at Cambridge. He published, in 1865, a remarkable work entitled "Ecce Homo, or the Life and Work of Jesus Christ." It was followed, in 1882, by "Natural Religion," but this attracted much less attention than his first writing. Subsequently he became devoted almost exclusively to history, and besides many others published an elaborate history of the recent developments of the German Empire, entitled "Life and Times of Stein." He contributed to many European and American magazines. In 1894 he was knighted. Among his writings not named above are "Expansion of England," "History of Napoleon I.," "Goethe Reviewed after Sixty Years," "Roman Imperialism," and "Letters and Essays."

SEGUIN (sā-găn'), **Edouard Onesimus,** physician, born at Clamecy, France, Jan. 20, 1812; died Oct. 28, 1880. He came to the United States in 1848 and soon after settled at Cleveland, Ohio, to practice medicine. Subsequently he became a teacher and trainer of idiot children at Syracuse, N. Y., and in 1879 established the Seguin Physiological School for feeble-minded children in New York City. His success in the treatment of idiots, both in France and the United States, gave him a wide reputation. He published a number of works on his favorite theme, including "Idiocy, and Its Treatment by the Physiological Methods."

SEIDL (zī'd'l), **Anton,** musical conductor, born in Pesth, Hungary, May 6, 1850; died in 1898. He studied music at Leipsic and Bayreuth under Richter and Wagner, and in 1876 became stage director at the first production of Wagner's *Nibelungen* drama at Bayreuth. In 1879 he became conductor at Leipsic, where he remained until 1882, and three years later was called to conduct the German opera in New York City, succeeding Leopold Damrosch. He succeeded Theodore Thomas as conductor of the Philharmonic Society in 1891. Subsequently he conducted musicales at Convent Garden, London, and in many other cities in Europe, including the Bayreuth Festival in 1897.

SEIDLITZ POWDERS (sĕd'lĭts), a medical preparation named from the saline springs in Seidlitz, a village of Bohemia, used as an agreeable and effective aperient. These powders consist of 35 grains of powdered tartaric acid, inclosed in white paper, and 40 grains of bicarbonate of soda and 120 grains of tartrate of soda and potash, in blue paper. The contents of the two papers are dissolved separately, each in a half tumbler of water, and the two are then poured together. Immediately an effervescence takes place, during which the mixture should be taken. Rochelle salt is a similar preparation and the two names are frequently interchanged.

SEINE (sān), a river of France, which rises in the department of Côte d'Or, a short distance northwest of Dijon, and after a course of 481 miles toward the northwest discharges into the English Channel. It flows through a highly fertile region and has a number of important tributaries, including the Oise, Marne, Aube, and Yonne rivers. Vast canals have been constructed to connect with the Seine making it the basis of a large interior and foreign trade. The improvements from its mouth to Paris are particularly extensive, while Rouen has been made a seaport by deepening its channel and constructing immense wharves. Among the principal cities on the Seine are Paris, Le Havre,

Rouen, Saint Germain, Melun, and Fontainebleau, thus making the river important next to the Thames and the Hudson. The basin has an area of 30,000 square miles. It is navigable for a distance of 350 miles from its mouth.

SEISMOGRAPH (sīs'mŏ-grȧf), or **Seismometer,** an instrument to indicate and record the motions on the surface of the earth during an earthquake. Various instruments are made for this purpose, including the *seismoscope,* which merely leaves a record of the tremor of the earth, either with or without indicating its time. However, the seismograph, or seismometer, records the direction, period, and extent of the shock. Most instruments of this class have an index, which is set in motion by the shock, thus tracing the horizontal and vertical movements on smoked glass or a similarly blackened surface. The newer instruments contain electrical mechanisms, which are set in motion by the movements, and are sufficiently sensitive to record exceedingly mild tremors. They not only indicate the vertical and the horizontal movements, but record each shock, the direction, the maximum intensity, and the duration of each movement. Instruments of this class are used in the observatory on Mount Vesuvius, Italy, and the Leland Stanford Junior University, California.

SEJANUS. See **Tiberius.**

SELENE (se-lē'ne), in Greek mythology, the daughter of Hyperion and Theia, sister of Helios and Eos, and worshiped as the goddess of the moon. Some writers identify her with Phoebe, the sun god, and in later times she was associated with Artemis. She is represented in statuary as driving across the heavens in a chariot to bring light to men. White horses or cows draw her chariot and in some instances her symbol, the crescent moon, is borne in a conspicuous place.

SELENIUM (sē-lē'nĭ-ŭm), a nonmetallic element classed immediately between sulphur and tellurium. It was discovered in Switzerland by Jöns Jakob Berzelius (1779-1848) in 1817. Selenium is a rare element, occurring in composition with other minerals, especially silver, gold, copper, bismuth, and lead, but small quantities have been found in a free state in Mexico. When oxidized and dissolved by nitric acid, it yields *selenious acid.* It is obtained as a dark-brown, vitreous and amorphous modification, or as a lead-gray crystalline mass, and is noteworthy for its variations as a nonconductor of electricity. The resistance to electricity is less in the light than in the dark, on account of which it has various uses in electrical contrivances and the photophone. Tellurium is a nonmetallic element of the same group as selenium. It is of rare occurrence and is found either native or in combination with metals. The resistance to electricity is similar to but less marked than that of selenium.

SELEUCIA (sē-lū'shĭ-ȧ), the name of seven cities in Asia, all of which were built in the early history of the dynasty of Seleucidae. Two of these were particularly famous, both for their commercial importance and political power. The earliest was Seleucia Pieria, founded by Seleucus Nicator in 300 B. C. It was situated near the mouth of the Orontes, twelve miles west of Antioch, of which it was the seaport. During the war between the Ptolemies and the Seleucidae for predominance in Syria it formed an important strategic point, but with the rise of Roman power it declined rapidly. The excellent port is still in a state of preservation, but the walls, temples, amphitheaters, and citadel are in ruin or entirely destroyed. The only connection between the city and the sea was a tunnel cut through the solid rock, having a length of 1,087 yards.

Seleucia-on-the-Tigris was the most celebrated of these cities, being for many years the eastern capital of the Seleucidae. It was founded by Seleucus Nicator about 35 miles northeast of Babylon and was built largely of material taken from the latter city, after that famous emporium had been ruined. Its growth was remarkable. In its greatest prosperity it had about 600,000 inhabitants and formed the most important commercial center of Asia even to the time of Strabo. When Western Asia was conquered by the Romans, it became the point of attack by the Persians, and was finally burned by Trajan in 116 A. D. At the time Emperor Julian made his expedition to the East he found the city entirely destroyed, and the country surrounding its ruins was the haunt of wild beasts.

SELEUCIDAE (sē-lū'shĭ-dȧ), the dynasty of kings that succeeded Alexander the Great in governing a large part of Western Asia. Their dominion included Syria, portions of Asia Minor, and the Eastern Provinces. The dynasty was founded by Seleucus Nicator (358-280 B. C.), who was a general under Alexander the Great, and after the death of the latter became satrap of Babylonia. A misunderstanding between him and Antigonus caused him to take refuge in Egypt in 316 B. C., where he secured assistance from Ptolemy, governor of Egypt, in taking the field against Antigonus, and he finally returned to his satrapy in 312 B. C. He conquered Media soon after and assumed the title of Seleucus I. in 306 B. C., thus founding the dynasty, and rapidly extended the borders of the kingdom from the Indus to the Oxus River. Four years later he formed an alliance with Ptolemy, Cassander, and Lysimachus against Antigonus, defeating the latter at Ipsus in 301 B. C., and in the general division of territory secured Syria and portions of Asia Minor, but with the death of Lysimachus, King of Thrace, he annexed all of Asia Minor.

Seleucus I. was assassinated in 280 B. C. by Ptolemy Ceraunus and was succeeded by his son, Antiochus I. This king sought to make the East Greek, as his father had endeavored

to do before him, but was killed in a battle with the Gauls, who had invaded Asia Minor in 261 B. C. He was succeeded by a number of kings bearing the name of Antiochus, Seleucus, and Demetrius, but of these Antiochus III., surnamed *The Great,* was the most noted. He was the first to come into collision with the Romans, but was defeated by Acilius Glabrio at Thermopylae in 191 B. C. and soon after by Scipio. From that time the power of the Seleucidae declined rapidly, being weakened by a loss of the kingdoms of Bactria, Armenia, Parthia, and Judaea, and the last small remnant was made a Roman province by Cneius Pompeius in 65 B. C.

SELIM I. (sē'lĭm), Sultan of Turkey, son of Bajazet II., born in 1467; died Sept. 22, 1520. He was of a warlike disposition and secured the support of the Janizaries, with whose aid he dethroned his father and became monarch on April 25, 1512. It was his policy to remove every possible obstacle that might rise against his power and with that end caused the death of his father, brothers, nephews, and many others who might possibly aspire to the throne. He declared war against Persia in 1514. In the same year he invaded that country with an army of 250,000 men and, after defeating Shah Ismail at Chalderon, annexed Kurdistan and Diarbekir to his dominion. He left a part of his army in Asia and invaded Egypt, where he defeated the forces of the Mamelukes.

The victorious army of Selim I. entered Cairo in 1517, where his chief opponents were put to death, and Egypt became incorporated with the Ottoman Empire. The last descendant of the Abasside caliphs of Egypt bestowed upon him the title of Iman and the standard of the prophet, and in consequence the Ottoman Sultan of Constantinople became the chief of Islam, as the legal representative of Mohammed. This distinction was soon after recognized by the sacred cities of Medina and Mecca, and his supremacy was acknowledged by the leading Persian chiefs. Though a fierce and cruel warrior, Selim was noted as a patron of literature and art. During his reign a powerful navy was built, the Janizaries were controlled, and the dominion was extended more than during the reign of any of his illustrious predecessors. He was succeeded by Solyman I.

SELIM III., Sultan of Turkey, son of Mustapha III., born Dec. 14, 1761; died in 1808. He succeeded to the throne after the death of his uncle Abdul-Hamid, in 1789, and immediately adopted a policy favorable to improvement, but his plans were disturbed by wars with Russia and Austria in Europe and with the French in Egypt. Austria compelled him to cede Choczim in 1791, and Russia obtained all his possessions beyond the Dniester by the Peace of Jassy in 1792. His progressive plans for clothing, arming, and disciplining his troops in the European fashion caused the dervishes to openly preach revolt, charging Selim with despising the holy injunctions of the Koran, and he was finally deposed by the Janizaries in 1807. In his reign many factories were established and internal improvements were fostered, but an organized attempt to reinstate him on the throne in 1808 was the immediate cause of his being assassinated.

SELINUS, an ancient city on the southwestern coast of Sicily, founded by a colony of Greeks about 630 B. C. The Athenians sent an expedition to Selinus in 415 B. C., owing to wars with people native to the island. An army of Carthaginians intervened in behalf of the native people in 409 B. C., when a large number of inhabitants were killed or carried away as slaves. In the First Punic War, about 250 B. C., the city was entirely destroyed and was never rebuilt. Ruins of large Greek temples are still extant, including one about 370 feet long and 177 feet wide. This structure was consecrated to Apollo and contained many sculptures. Several fine specimens of the latter are now in the museums of Palermo.

SELJUKS (sĕl'jūks), or **Seljooks,** the name of several Turkish dynasties, which descended from one family and governed large parts of Asia from the 11th to the 13th centuries. The dynasty was so named from Seljuk, a chief of a small tribe of Bokhara and the surrounding country, in the early part of the 11th century. His grandson, Togrul Beg, became the chief of a tribe that had migrated to northern Khorasan and established his government at Nishapur. He subdued Balkh and Khaurezm in 1041 and Bagdad in 1055, and became the reigning monarch at the last mentioned city. Togrul Beg was a warm supporter of the Moslem faith, which caused him to build numerous mosques and support pious and learned men. He was succeeded by his nephew, Alp Arslan, in 1063, as ruler of Persia, who soon after conquered Palestine and Syria from the caliphs of Egypt and in 1071 made Diogenes, Emperor of Byzantine, a prisoner. As a ransom for Diogenes, he received a large part of Asia Minor.

Alp Arslan was succeeded by his son, Melek Shah (1073-1093), who is noted as the most powerful of the Seljuk monarchs. He not only solidified the empire, but annexed all of Asia Minor and Arabia, thus governing the extensive region lying between Chinese Tartary and the Hellespont. His reign was aided by the influence of his grand vizier, Nizam-ul-Mulk, who is noted for his progressive scholarship and friendship for learning. Many bridges, canals, highways, hospitals, and colleges at Herat, Bassora, Ispahan, and Bagdad attest the progressive spirit of that epoch. Smaller kingdoms began to form after the death of Melek Shah, the foundation for which had been laid by that ruler, since he established a number of principalities that were professedly subject to the center state

of Iran or Bagdad. Saladin was one of the Seljuk chiefs and as such came in contact with the Crusaders. Others like him began to assert their power until finally the monarchy became dissolved. The Mongols under Genghis Khan pressed the Mohammedans toward the west and their dominion at length fell entirely, the Seljuk dynasty ending with Kaikobad in 1315. The Ottoman princes succeeded the Seljuks, both of whom were Turks, and thus the foundation for the Turkish or Ottoman Empire was laid.

SELKIRK (sĕl'kĕrk), **Alexander,** the prototype of Robinson Crusoe, born in Largo, Scotland, in 1676; died in 1723. He was the son of a shoemaker and tanner, whose name was Selcraig, and at an early age left home to engage in a seafaring life. In 1703 he became engaged as a buccaneer in the South Seas, and, being of a quarrelsome disposition, disagreed with his captain. In October of the same year he was put on the island of Juan Fernandez, where he remained a solitary resident for four years and four months, when he was rescued by Capt. Woodes Rogers, who made him commander of a privateering vessel. He returned to Scotland in 1712, but again went to sea, rising to the rank of lieutenant in the navy. A statue has been erected to his memory in his native town. Daniel Defoe made the experiences of Selkirk prominent in his "Robinson Crusoe," which he published in 1719, but this famous book contains many experiences drawn from imagination. See **Juan Fernandez.**

SELKIRK MOUNTAINS, an elevated mountain range in southeastern British Columbia. It belongs to the Rocky Mountains. The range is about 175 miles long by 80 miles wide, and lies immediately west of the Rocky Mountains proper. Mount Sir Donald, height 9,945 feet, is the culminating peak. The Canadian Pacific Railway crosses the range through Roger's Pass, at an altitude of 4,300 feet. It has an abundance of valuable timber to a height of nearly 6,000 feet, but snow lies perpetually on the elevations exceeding 7,000 feet. The presence of vast snow deposits gives rise to large glaciers, which in former times were even more extensive than at present, a fact evidenced by numerous moraines.

SELMA (sĕl'mà), a city in Alabama, county seat of Dallas County, on the Alabama River, 48 miles west of Montgomery. It has navigation facilities and is on the Louisville and Nashville, the Southern, the Western of Alabama, and other railroads. The place is well platted and handsomely built and in the surrounding country are rich cotton, lumber, coal, and iron productions. Among the manufactures are cotton-seed oil, ice, cotton batting, dairy products, car wheels, cigars, fertilizer, machinery, and clothing. The principal buildings include the county courthouse, the public library, the Y. M. C. A., the Dallas Academy, the high school, and the Alabama Methodist Orphanage. It has public waterworks, sanitary sewerage, and substantial street pavements. The place was settled in 1823. Population, 1900, 8,713; in 1920, 15,607.

SELOUS (sẹ-lōō'), **Frederick Courteney,** explorer, born in London, England, Dec. 31, 1851. He studied at Rugby and in Germany, and in 1871 went upon an exploring expedition to South Africa. For nearly twenty years he traveled in Matabeleland and the south central part of Africa, where he hunted elephants and made a collection in natural history. He participated in the first Matabele War, in 1893. Subsequently he visited England, but returned to Africa at the time of the rinderpest in Matabeleland. His books include "Sunshine and Storm in Rhodesia," "Sport and Travel, East and West," and "A Hunter's Wanderings in Africa."

SELVAS, the name applied to the forest regions of South America, especially to the timbered plains of the Amazon basin. They are located in a vast extent of country where rainfall is abundant, and are characterized by many climbing plants and a great variety of trees of large size. India rubber, lumber, and medicinal barks are obtainable in large quantities, but the greater part of these forests have not been utilized and are still in a primeval condition. The region as a whole may be said to contain some of the largest and most valuable forests in the world.

SELWYN (sĕl'wĭn), **Alfred Richard Cecil,** geologist, born at Kilmington, England, July 28, 1824; died in 1904. He studied under private tutors in England and Switzerland and entered the British survey service in 1845. In 1852 he was made director of the geological survey in Victoria, Australia, and subsequently explored the coal and gold fields of Tasmania and South Australia. He became director of the Canada geological survey in 1869, which post he held until 1895. The following year he was made president of the Royal Society of Canada. Besides contributing to numerous periodicals, he wrote the Canadian part of Sanford's "Compendium of Geography and Travel."

SEMAPHORE (sĕm'à-fōr), an apparatus for giving signals by lanterns, flags, and oscillating arms. Signals of this kind were formerly very common in the military organizations as well as on railroads, but they have been superseded largely by the use of electrical communication. Railways still employ semaphore signals of various kinds. They consist of posts from ten to twenty feet in height, at the top of which are two forms of arms, one being notched and the other square-ended. The latter are painted red on the side toward the trains they signal and white on the other side, and at night red or white lights are used for the same purpose. In most cases the red signal indicates danger, hence the engineer is cautioned to stop or run slowly. The white signal, or light, indicates that the train is to proceed without stopping.

In some cases the arm is dropped to indicate a clear track, is raised to an angle of 45° to signify caution, and is elevated to a horizontal position as a signal that the train is to stop.

SEMBRICH (zĕm'brĭk), **Marcella,** operatic singer, born in Lemberg, Austria, Feb. 15, 1858. She descended from parents native to Galicia and her real name was Marcelline Kochanska. For some time she studied under Liszt in Vienna, but later found that she was better adapted to soprano singing than to play on the piano. In 1877 she made her début in Athens, Greece, and soon after appeared successfully in Vienna and Dresden. She sang successfully in the leading cities of Europe a number of years and several times visited America. She attained her greatest successes in the characters of *Lucia, Constance, Martha, Susanna,* and *Zulina.*

SEMELE (sĕm'ĕ-lē), in Greek legends, a beautiful princess, the daughter of Cadmus, King of Phoenicia. She became noted because of the affection bestowed upon her by Zeus. Hera, the haughty queen of heaven, was jealous of her, and artfully persuaded her to insist upon Zeus visiting her in all his power and glory, well knowing that this would cause her instant death. When asked to grant a request, Zeus vowed by the Styx that he would accede to her wishes whatever they might be. Semele begged of Zeus to appear to her in all the glory of his divine power and majesty, and, having vowed to do so, he was compelled to grant her wish, but she was immediately consumed in the flames of the lightning. However, her son by Zeus, who was called Dionysus, was saved and became the god of wine.

SEMINOLES (sĕm'ĭ-nōlz), an Indian nation of Florida, which was composed chiefly of Creeks, from whom they separated in 1750. They aided the British in the War of 1812 and subsequently gathered other Indians and Negroes until, in 1818, they numbered about 4,000. Their invasions of Georgia and the destruction of property and life caused the government to send Gen. Andrew Jackson against them in 1818, who, after defeating them and destroying a number of their towns, captured Ambrister and Arbuthnot, two English adventurers, who were summarily hanged for inciting trouble with the Indians and the Spanish.

The annexation of Florida to the United States, in 1819, caused many Negroes to join the Seminoles, and war ensued, when the government decided to remove them to the West. A treaty in 1823 resulted in ceding most of their lands and, in 1832, the chiefs agreed that the tribe should be removed west of the Mississippi. Osceola stubbornly resisted removal and became the leader in a destructive war that lasted seven years, from 1835 to 1842. He was captured treacherously in the latter year. In 1845 a treaty was concluded by which the Seminoles were removed west of the Mississippi, and in 1856 lands lying west of the region occupied by the Creeks were assigned to them. The Seminoles number about 3,000 and include many industrious farmers, manufacturers, and professional men. They support a large number of churches, mostly Presbyterian, and are devoted to schools and learning.

SEMIRAMIS (sĕ-mĭr'ă-mĭs), the Queen of Assyria and Babylonia, reputed one of the most powerful rulers of Asia. Tradition makes her a daughter of Derceto, the fish goddess of Ascalon, and of a Syrian youth. She was exposed to death by her mother, but was fed by doves and afterward found and adopted by the chief of the royal shepherds. Omnes, governor of Nineveh, was attracted by her beauty and made her his wife, but she won the love of King Ninus by a heroic exploit, the capture of Bactria, which had defied the forces of the king. Omnes hanged himself to give Semiramis freedom to become the wife of Ninus, but that ruler died soon and she was proclaimed Queen of Assyria, ruling over that mighty empire for 42 years. She traveled in all parts of her dominion, founded Babylon, and made it the most powerful city in the world. In her reign stupendous monuments were built, highways were opened, canals were constructed, and large regions were added to the empire, particularly Libya, Persia, and Ethiopia. The dates of her birth and death are extremely doubtful, being assigned by most writers between the years 2182 and 800 B. C. The Hanging Gardens of Babylon are attributed to her time, and there are other antiquities that give evidence of her long and successful reign. She was succeeded by her son, Ninyas. According to tradition, she disappeared after assuming the form of a dove and was long worshiped as a deity.

SEMITES (sĕm'īts), the name of a group of nations. They are allied closely in physical features, language, and religion, and are regarded the descendants of Shem, a son of Noah. The peoples embraced in this group are distributed in many countries, but the region of their nativity is in Arabia, Syria, Chaldaea, Abyssinia, Phoenicia, Ethiopia, and Palestine. It is generally assumed that the first representatives were confined to Arabia about 4000 B. C., where they led a nomadic life, but later migrated into Mesopotamia. After dwelling for some time under the priest government of the Turanians then occupying that region, they became identified with the ruling classes, and finally spread over large parts of Western Asia and Northern Africa. The cities of Tyre and Sidon are among the many emporiums founded by Semites, and for centuries they were the predominating power of that region of the world. The language differs from the Aryan and the different Semitic nations have kept closer together and undergone less change than the Aryan peoples.

Properly there are two divisions of the ancient dialects, one being generally known as the north-

ern and the other as the southern Semitic languages. The northern dialects comprise those spoken in ancient Assyria and Babylonia, together with the tongues of the Hebrews, Phoenicians, Carthaginians, Chaldaeans, Aramaians, and Syrians. They are nearly extinct as spoken tongues, Hebrew being the only one used at present in writing. To the southern Semitic tongue belong the Arabic, Amharic, Ethiopic, and Himyaritic. Ethiopic was anciently the language of Abyssinia, but it has given way to Amharic and other modern tongues. The Arabic language is used most extensively of the Semitic tongues and includes the four spoken dialects of Egypt, Barbary, Arabia, and Syria. Among the marked peculiarities of the Semitic languages is the triliterality of the roots, these consisting of three consonants, and the inflection by means of internal vowel change. It is peculiar for its absence of compound words.

The Semitic people are distinguished for their worship of one God. They are the early teachers of three religions which embrace the doctrine of one Deity; namely, the Jewish, Christian, and Mohammedan. Through them the Bible and the Koran were given to the world. They distinguished themselves in literature, arts, and many of the sciences. It was from Phoenicia that commerce and western colonization spread, while the powerful Carthaginian empire sent forth its Hannibal, and the Babylonians and Assyrians reared mighty empires and cities of great wealth. The Phoenician alphabet is not the oldest, but from it came most of the alphabets of Asia and Europe, while the system of notation in common use is from the Arabic. To them must be credited the preservation of learning while the Dark Ages spread their shadow over Europe, and their sacred books and cities are still the attraction of thousands.

SEMMES (sĕmz), **Raphael,** naval officer, born in Charles County, Maryland, Sept. 27, 1809; died Aug. 30, 1877. He studied law and entered the navy. Subsequently he took part in the Mexican War and from 1859 to 1861 served as secretary of the lighthouse board. He resigned that office at the beginning of the Civil War to enter the Confederate navy, when he became commander of the steamer *Sumter.* With it he captured eighteen merchantmen and sailed to Europe, but the steamer *Tuscarora* pursued and finally blockaded him at Tangier, Morocco. He sold his ship to evade capture and in 1863 returned to the United States in command of the famous *Alabama,* a steamer built and manned in England. With that vessel he captured 62 merchant vessels and destroyed the gunboat *Hatteras* off Galveston, but was pursued by the *Kearsarge* and his vessel was sunk off the harbor of Cherbourg, France, June 19, 1864. He escaped on a British vessel and returned to the United States, was soon after made rear admiral in the Confederate navy, and commanded the water approaches to Richmond. In 1865 he joined General Johnston in the capitulation of Greensboro, N. C. Subsequent to the war he practiced law at Mobile, where he was arrested in 1865, but was released after several months' imprisonment. Afterward he became editor of a daily paper at Mobile and later was professor in the Louisiana Military Institute at New Orleans. The Alabama Claims originated from his naval career. He published "Campaign of General Scott in the Valley of Mexico," "Memoir of Service Afloat During the War Between the States," and "The Cruise of the Alabama and the Sumter."

SEMPACH (zĕm'päk), a town of Switzerland, in the canton of Lucerne, on the east shore of Lake Sempach. It has a population of 1,250 and would be of little more than local interest but for the decisive battle that occurred here on July 9, 1386, in which the Swiss gained a decisive victory over the Austrians. The Swiss army of 1,300 was under command of Arnold von Winkelried and the Austrian army of 5,400 was under Duke Leopold. The Swiss army made a desperate attack and totally defeated the Austrians, who lost 2,000 troops and 600 nobles, while the Swiss lost only 200 men. A chapel marks the site of the battlefield. The anniversary of this battle is still celebrated with imposing ceremonies in Switzerland.

SENATE (sĕn'ăt), the deliberative assembly of the Roman people. Originally it was composed of 100 members, each representing one of the *decuriae* into which the body of the Roman citizens was divided, at the time they comprehended the single tribe known as the Ramnenses. With these the Sabines were incorporated as a second tribe, hence an equal number of senators was added. When the third tribe, the Lucerenses, were added, the number was increased to 300. Subsequently the number varied greatly, exceeding 1,000 during the second triumvirate, but Augustus reduced it to 600. The senators held office for life. They were elected by the *decuriae* during the kingly period; by the consuls and consular tribunes, under the republic; and by the censors, after the establishment of the censorship. The plebeians as an order were never eligible, but they frequently attained to the senatorial dignity after the quaestorship and curule magistracies were opened to them. Hence the senate, originally a purely aristocratic body, became gradually the real representative of the people. The term is applied to the upper branch of the legislature in many states and countries, as in France, the United States, and some cantons of Switzerland. See **Congress.**

SENECA (sĕn'ĕ-kă), **Lucius Annaeus,** noted philosopher, born in Cordova, Spain, in the year 3 B. C.; died in 66 A. D. He was the son of Marcus Annaeus Seneca (61 B. C.-37 A. D.), a celebrated rhetorician, who taught rhetoric with success in Rome in the time of Augustus. Seneca the Philosopher, as the younger was

called, was taken to Rome at an early age, where he studied eloquence, philosophy, and law, but left the bar because Emperor Caligula threatened his life. He entered public life soon after, and in filling the office of quaestor rose to high favor with Emperor Claudius, but he was banished in 41 A. D. on a charge of intimacy with Julia, a niece of the emperor. In 49 he was called to the Roman capital, where he became praetor and afterward tutor to Emperor Nero, who, on ascending the throne, made him a consul in 57. It may be said that the influence of Seneca was highly potent in the bright years of Nero's reign, but when the emperor became tainted with crime and corruption he came to dislike his former tutor.

Seneca vainly petitioned the emperor to allow him to retire from office, offering at the same time to bestow upon him his large fortune, but the emperor had planned to cause his death. An attempt to poison him failed, but he soon after caused him to be charged with being implicated in the conspiracy of Pisa, and was condemned to put himself to death. Seneca chose to die by bleeding and accordingly cut several veins of his arms and legs. He is the author of many excellent works, among them treatises on "Anger," "Steadfastness of the Wise Man," "Providence," "Tranquility of Mind," and "Clemency." The last mentioned was addressed to Nero. Other writings include "Consolatio ad Helviam," a letter of consolation addressed to his mother; "Consolatio ad Polybium," a letter consoling Polybius on the loss of his brother; seven books on "Investigations of Nature;" seven books on "Benefits;" and eighteen books of moral letters. Many tragedies are attributed to him, all of which are remarkable for beauty of style, but they are inferior as productions for the stage.

SENECA FALLS, a village of New York, in Seneca County, on the Seneca River, ten miles northeast of Geneva. It is on the State Barge Canal and the Lehigh Valley and the New York Central railroads. The adjacent country is fertile, yielding grasses, fruits, and cereals. In the vicinity are picturesque lakes and deposits of gypsum and building stone. Among the chief buildings are the public library, the high school, the Johnson Home for Indigent Children, and the Mynderese Academy. The manufactures are machinery, lamps, cotton and woolen goods, and lumber products. Electric railways furnish communication to Cayuga Lake Park and other points of interest. The place was settled in 1791 and incorporated in 1831. Population, 1900, 6,519; in 1920, 6,389.

SENECA LAKE, an elongated body of water in New York, lying between the counties of Seneca, Ontario, Schuyler, and Yates. The length is 35 miles; width, from one to four miles; and elevation, 247 feet above sea level. The greatest depth is 630 feet and its shores are picturesque and in many places quite abrupt. It is important for its fisheries and navigation facilities, being connected with the Erie Canal. The Seneca River issues from its northern end, which, with the Oswego River, carries the drainage to Lake Ontario.

SENECAS (sĕn'ē-kăz), an Indian tribe of the Iroquois family, formerly resident in western New York, where they became allied with Pontiac. They favored the English during the Revolution, but made peace with the Americans in 1784. In 1812 they joined the Americans, but a small part became allied to the hostile tribes of the west, though peace was concluded with them in 1815. This band was removed to Indian Territory, now Oklahoma, in 1831, but about 2,750 Senecas are still on reservations in New York.

SENEGAL (sĕn-ē-gal'), a river of Western Africa, which rises on the northern slopes of the Kong Mountains, near the sources of the Niger, and after a course of about 1,000 miles flows into the Atlantic near Saint Louis. It receives an important tributary at Bafulabe, which is connected with Kayes by railway to overcome a number of falls, and from the latter town it is navigable to its mouth, a distance of nearly 700 miles. In its lower course are many branches leading from the main channel, forming numerous fertile islands, but materially lessening its importance for navigation by the larger vessels. A large portion of its basin has productive soil. Considerable timber occurs along its banks.

SENEGAL, a French colony in Western Africa, situated in Senegambia, comprising the coast region from a point somewhat north of Cape Verde to the British colony of Gambia. It includes the island and town of Saint Louis, at the mouth of the Senegal River, and a region extending inland from the coast equal to about 200,000 square miles. The population is estimated at 3,200,000. This region was first settled by the French in 1637, and is the base of operations politically and commercially for all of Senegambia, which see.

SENEGAMBIA (sĕn-ē-găm'bĭ-ā), an extensive colonial possession of France, in Western Africa, lying south of the Sahara, west of the Sudan, north of Guinea, and east of the Atlantic. It includes the colony of Senegal and a number of protected states, the whole comprising 415,800 square miles. French claims to this vast territory date from 1637, when they made settlements near the mouth of the Senegal River, and since then have been enlarging their sphere of influence toward the interior. Within recent years their claims have been extended to include the territory from the Mediterranean to the Gulf of Guinea, west of Tripoli and Lake Tchad, except only Morocco and Spanish territory on the west coast and portions of the coast from British Gambia to the Niger Territories. The portion of this region included in Senegambia is governed from Saint Louis, its local capital,

where the governor general has his seat. He is assisted by a colonial council and is represented in Paris by a deputy. Saint Louis, Dakar, Kayes, Bakal, and Bafulabe are the principal trade centers.

The region lying along the Atlantic coast is generally low and swampy, the flat country extending inland from 100 to 200 miles. However, the surface rises from these low plains toward the east, terminating in mountain ranges that extend south of the Senegal River and between the headwaters of the Senegal and the Niger. The Kong Mountains are the most important highlands, rising to elevations about 3,500 feet above sea level, and between them and the coast regions is a lofty and more or less undulating plain. Thus, the region may be divided into Low, Middle, and High Senegambia, all being more or less important commercially. Low Senegambia is noted for its fertility of soil, and produces large quantities of cereals and fruits. Middle Senegambia is inhabited by numerous Negro tribes. It has a hot climate and a fertile soil and yields fruits, timber, and domestic animals. High Senegambia is inhabited largely by Moors, who are adherents of the Mohammedan faith. Many wild animals infest various parts of Senegambia, including antelopes, hippopotami, elephants, lions, panthers, leopards, hyenas, crocodiles, and monkeys. The climate of many sections is unhealthful for Europeans, particularly those lying near the marshy regions. Among the chief exports are yams, rice, maize, bananas, oranges, citrons, timber, and minerals.

The French are pushing vigorously the policy of introducing the rearing of domestic animals and the culture of many kinds of fruits, vegetables, and cereals. They are constructing railroads and improving the rivers by dredging and canals. The more important streams are the Senegal, Gambia, Nunez, Niger, and Rio Grande, all of which are of more or less importance commercially. In their basins are vast forests of palm, mangrove, baobab, teak, and other tropical trees. The most important railroads include a line from Dakar to Rufisque and Saint Louis, and another from Kayes on the Senegal to Bammuku on the Niger. The latter connects the navigation of the two river systems. Moors and Negroes constitute the inhabitants, but the races are intermixed to some extent. Population, 1922, 2,608,600.

SENN, Nicholas, surgeon and traveler, born in Buchs, Switzerland, Oct. 31, 1844; died Jan. 2, 1908. He was brought to the United States by his parents in 1853 and for some time resided in Fond du Lac County, Wisconsin. In 1864 he graduated from the high school in Fond du Lac, taught in the public schools, and later studied medicine in Chicago. Subsequently he studied at the University of Munich, Germany, and practiced his profession in Fond du Lac and Milwaukee. In 1893 he removed to Chicago, where he became professor of surgery in the Chicago College of Physicians and Surgeons. Later he was professor of practical and clinical surgery at Rush Medical College. He traveled extensively in both hemispheres and made several notable trips to the Arctic region. His books include "Intestinal Surgery," "Syllabus of Surgery," "Four Months Among the Surgeons of Europe," "Surgical Bacteriology," "Tuberculosis of the Bones and Joints," "Surgical Notes on the Spanish-American War," "Around the World via India," "Nurse's Guide for the Operating Room," and "In the Heart of the Arctics."

SENNA (sĕn'nà), the dried leaflets of several species of cassia, plants belonging to the bean family. These plants are native to Northern Africa, Western Asia, and Southern Europe, particularly to Arabia, Tripoli, and Egypt. Several allied species are native to the Eastern United States, where they are known as wild senna, and the leaflets are used as a mild cathartic. Senna has long been employed in Western Asia as an important medicine. Its use was

SENNA.
Flower and Seeds.

introduced to Europe by Arabian physicians in the 9th century. The dried leaves are now a staple drug and yield medicinal properties useful in the treatment of numerous ailments, serving as a purgative and as a confection.

SENNACHERIB (sĕn-năk'ĕ-rĭb), King of Assyria, son of Sargon, whom he succeeded on the throne in 705 B. C., and reigned until his death in 681 B. C. Among the notable events of his reign are the suppression of two revolts of Baylonia and successful wars against Ethiopia, Egypt, Armenia, Phoenicia, and Media. After a general invasion of Judah, he carried 200,000 Jews into captivity and required King Hezekiah to pay tribute money into his treasury. Hezekiah revolted against this oppression the following year, which was the cause of a second invasion of Judah. After marching through Palestine, he besieged Libnah, where an angel of the Lord is said to have slain 185,000 of his

Assyrian warriors, and he was compelled to make a hasty retreat to Nineveh. His reign of 22 years was eminently successful and witnessed the building of many palaces, monuments, canals, and highways. His improvements are mentioned with equal favor in the Scriptures, by Josephus, and by the Greek historian Herodotus. The most elaborate palace was that at Koyunjik, which covered an area of eight acres and contained many rare sculptures.

SENSATION (sĕn-sā'shŭn), a cognized affection of the nerves, or a modification of consciousness that results when some organ of sense is excited by external stimuli. The five organs of the senses, namely, the eye, the nose, the ear, the tongue, and the nerves that give rise to the sense of feeling or touch, are the end organs by which impressions are primarily received and thence transmitted to the brain. By means of these organs we become aware of light, sound, heat, mechanical pressure, color, scent, etc. Besides these some writers, as Professor Bain, add a sixth sense, that of muscular resistance. This sense is more than feeling, as in the case of lifting a weight one not only feels its surface, but experiences the sense of something resisting muscular effort. Perception by the senses is the basis of all our knowledge or mental activity. It is probable that a child deprived of all his senses would give no evidence of possessing a mind. The first mental act is attended or preceded by a cognition of impressions on the nerves; that is, the first thing one is conscious of is a sensation. The sense of touch or resistance is the most widely diffused, and the sensations arising from it are most readily perceived by animals. The others follow in the order named—sight, taste, hearing, and smell. See articles on the organs of the senses, **Eye, Ear,** etc.

SENSITIVE PLANT (sĕn'sĭ-tĭv), the common name of a shrubby plant of the bean family, which is native to tropical America. It attains a height of about one foot, has pinnate leaves, and bears small purple flowers in heads on long peduncles. This plant is remarkable for possessing a vegetable irritability, causing it to shrink from touch or disturbance. If a leaflet be touched, it folds rapidly, and if a branch is shaken, all the leaflets curl up and the branch bends toward the main stalk. In Panama it has been observed that a railroad train causes the leaves to fold when passing rapidly by a cluster of these plants. Several species possess the property of folding their leaves on the approach of night, and unfolding them at the return of light. These plants are cultivated quite extensively in hothouses.

SEOUL (sę-o͞ol'), the capital of Corea, on the Han River, about 25 miles by road from the Yellow Sea. It is situated in a valley between mountains, and around its outskirts is a stone wall. Seoul has only two wide and improved streets, all the remainder being about twelve feet wide and destitute of pavements and sidewalks. The architecture is mostly of wood, the buildings are covered with thatched roofs, and in the narrow streets are gutters for the escape of refuse matter, which is carried off by a shallow stream of water. The most important buildings include those of the government, which are situated within the city but are separated from the remainder by a secure wall. Manufactures are in a rude and very primitive state, the most important being clothing, mats, paper, tobacco, silk textiles, fans, and utensils. Seoul was founded in 1397 and became the capital in the latter part of the 16th century, but was sacked by the Manchus in the 17th century. It was closed to foreigners until within recent years, and there is still a strong prejudice against foreign visitors and modern improvements. Japanese troops occupied it in 1894 as a result of the war between China and Japan. Since 1905 the direction of public affairs has been in the hands of the Japanese. Population, 1922, 283,464.

SEPARATOR (sĕp'ā-rā-tĕr). See **Creamery.**

SEPIA (sē'pĭ-ȧ), the name of a species of cuttlefish, characterized by having an organ known as the ink bag. It is very abundant in the Mediterranean and the waters off the southern shore of Asia. The animal uses the black fluid in the ink bag to darken the water when attacked by an enemy, and it is thus enabled to retreat or escape in obscurity. This product is used extensively in the manufacture of ink. It is taken from the animal and carefully boiled and filtered, and in this form constitutes the sepia of commerce, which is sold in cakes and sticks as India ink. When drawn from the animal it is black, but in the process of manufacture it takes on a beautiful brown color. It is used chiefly by painters, and to some extent as an ink.

SEPOY (sē'poi), the name of native Hindu soldiers, which is used to distinguish them from the white or gora soldiers employed by the British. Efforts to train natives of good caste for the army were first made by the East India Company in the 18th century, who allowed them to use the sword and target instead of the musket, and to wear the turban, vest, and long drawers in place of regular uniforms. It was found that these soldiers rendered good service both in the English and French armies, facing danger with firmness and obstinacy. Soon after their number was increased, until in 1857 the Sepoys in the British service numbered 240,000, and the total army in India was only 300,000. In that year the high caste Hindus in the Bengal army incited the famous Sepoy Rebellion, which cost the British government many lives and fully $200,000,000. The Sepoy soldiers in the British service at present number 140,000 officers and men, this being about two-thirds of the present British army in India.

SEPTEMBER (sĕp-tĕm'bĕr), the ninth month of the Gregorian year. It was the sev-

enth month in the Roman calendar, the year beginning in March, as did the legal year in England until 1752. The Anglo-Saxons called it Gerst-month, or barley month, since that cereal was their most important crop, and ripens in September where these people dwelt.

SEPTIMIUS SEVERUS, Arch of, the name of a famous triumphal arch in Rome, erected by order of the senate in 203 A. D. It was dedicated to Septimius Severus and his two sons, Geta and Caracalla, and was erected to commemorate the victory over the Arabians and Parthians. Located on the Forum, at the end of the Sacred Way, it is one of the many historic structures of Rome. The arch is 75 feet high, has three passageways, and contains inscriptions and figures to represent scenes in the campaigns of Severus in Western Asia.

SEPTUAGINT (sĕp'tû-â-jĭnt), or **Alexandrian Version,** the name of the earliest Greek translation of the Old Testament. Formerly it was believed that the version was completed in 72 days by that number of men selected by the high priest, six from each tribe, and that the work was done on the island of Pharos. However, this view has been discredited. It is now generally understood that the translation covered considerable time, being completed as late as 100 B. C. The Greek Catholic Church still uses this version, but it has been superseded by other translations in the Roman and in the Protestant churches. However, it is held in high esteem for the criticism of the Hebrew text.

SEQUOIA TREES.

SEQUOIA (sē-kwoi'ȧ), the name of a genus of gigantic trees of the pine family, nearly allied to the bald cypress of the southeastern United States. These trees are so named from the Indian chief Sequoiah, who invented the Cherokee alphabet. Only two species occur, the redwood and the mammoth, both of which are native to California. The *mammoth* may be regarded the largest of trees, since it attains a height of more than 300 feet and a diameter exceeding thirty feet. Some of the eucalyptuses of Australia attain a greater height, but contain a considerably smaller bulk of wood, since the trunk is much smaller in girth. The sequoia trees are found mostly in groves in the Sierra Nevada Mountains and range from Calaveras County, California, toward the south and southwest about 200 miles. Among the famous groves of these trees is the Mariposa Grove, 16 miles south of the Yosemite Valley. It contains about one hundred giant trees, measuring 40 feet in circumference, and several others measuring about ninety feet. The largest of the trees in this grove is called the Father of the Forest, which has been broken for many years, but its trunk is still 300 feet long and has a diameter of 40 feet. The Mariposa Grove is government property, and these trees are preserved as remarkable wonders of nature. The wood is soft and white when felled, but turns red afterward, and is very durable. It is evident that some of the larger trees now living range in age from 2,000 to 3,000 years.

SERAGLIO (sȧ-rä'lyō), the old palace of the sultans at Constantinople, built by Mohammed II. on the site of the old acropolis. It is situated on an eminence that overlooks the sea, and its inclosing wall has a length of fully nine miles, within which are beautiful gardens, mosques, official buildings, and the harem. It has ample accommodations for 20,000 persons. The Seraglio is not used at present as the residence of the sultan.

SERAO (sȧ-rä'ō), **Matilda,** novelist, born at Patras, Greece, in 1856; died July 25, 1927. Her father was exiled from Italy and her mother was the Princess Scanary. She was left an orphan at an early age and was obliged to depend largely upon her own resources. After serving as a telegraph operator and a newspaper correspondent, she decided to devote her attention to literature. Her writings are classed among the best products of modern Italian novelists. They deal in a pleasing manner with the realistic, and are interwoven with psychological allusions. Her chief works embrace "Fantasy," "Ballet Dancer," "Land of Cockayne," "On Guard, Sentinel," and "Conquest of Rome."

SERAPIS (sē-rā'pĭs), or **Sarapis,** an ancient god of the Egyptians. This god was introduced in the time of Ptolemy I., who worshiped him with imposing honor. Plutarch and Tacitus relate that Ptolemy saw the image of a god in a dream, and was commanded to remove it from its place and bring it to Alexandria. Accordingly he sent an expedition to Sinope under the direction of a famous traveler, whence a colossal statue, originally made to represent Jupiter, was brought to Alexandria and declared to personify the god Serapis.

The name Serapis was derived from Osiris and Apis, and is said to have been the appellation given to the bull Apis after death, at the time it was made a god. The statue of Serapis was set up in a splendid temple at Alexandria, known as the Serapeum, to which was after-

ward joined the celebrated library of Alexandria. This temple was the last place of security held by the pagans when Christianity was introduced, and the worship of Serapis ceased with the destruction of the image by the Christian archbishop in 398 A. D., as ordered by Theodosius. Recent excavations at Memphis and other ancient cities have brought to light numerous remains of statues built to this deity. Various writers recount that 42 temples were built to his honor, but worship in them was largely confined to the Greeks and Romans, the Egyptians as a class never admitting him as a sacred deity.

SERF, a person whose service is attached to the estate on which he lives and with which he may be transferred. Serfdom had a wide foothold in Europe during the Middle Ages under the feudal system, when the condition of serfs was not exactly that of slaves, but resembled it in many respects. Three principal classes of laborers were maintained in most European countries, the freemen, the villeins, and the serfs. Villeins occupied a middle position between the other two classes and could with considerable ease become freemen, but a serf could become free only by purchase or extended military service. However, serfs were not regarded personal or chattel property like slaves, but they could be transferred with the property to other owners. The serfs gradually decreased in number as the conditions of manumission became easier under the general spread of education, and with the adoption of systems that led to social and industrial evolution. Serfdom existed in Scotland as late as the 18th century. The tenant practice prevalent in Ireland is little better than a mild form of serfdom—a condition that may not be overcome until the tillers of the soil become enabled to own the land instead of being required to rent it. Russia abolished serfdom on March 17, 1861, a proclamation being issued at that time by Alexander II.

SERINAGUR (sạ-rē′nŭ-gŭr), or **Srinagar,** a city of India, capital of Kashmir, on the Jhelam River, 175 miles northeast of Lahore. It is situated in a beautiful valley at an elevation of 5,275 feet, on both sides of the river, and has railway facilities and a large river trade. The streets are narrow and poorly improved, and most of the buildings are of brick and timbers. Gardens are cultivated on many of the roofs. The principal buildings include two large mosques, several mission schools, and the central railway station. A short distance east of the city is Lake Dal, about five miles long and three miles wide, made famous in Moore's "Lalla Rookh." This lake and Lake Wular, about 21 miles northwest, are connected by a canal. The natives cultivate vegetables in these lakes on floating rafts, called gardens. Shawls, clothing, utensils, and attar of roses are manufactured in the city. Population, 1906, 124,865.

SEROUS MEMBRANE (sē′rŭs), a delicate tissue in the human body, composed of flattened endothelial cells, normally moistened on the interior side by a serous fluid. It forms a covering or sac around certain organs, serving to allow free-organ action, and is associated with an absorbent system. The chief serous membranes are the two pleurae, inclosing the lungs; the pericardium, surrounding the heart; the peritoneum, lining the abdominal cavity; and the arachnoid, forming the middle of the three membranes enveloping the brain and spinal cord. The diseases to which these membranes are subject include dropsical effusions, morbid growths, hemorrhage, and inflammation, such as pericarditis and pleurisy.

SERPENT CHARMING, the art of influencing vicious and poisonous serpents to the extent that they may be handled without danger. The practice of charming serpents is of great antiquity, and was undoubtedly first practiced by daring persons who sought to inspire awe or gain advantages over the chiefs or their tribe. It is a part of some exhibitions, in which it is practiced to entertain or amuse the spectator. Many people of Asia travel from place to place and make their living by giving entertainments as snake charmers. Those who practice the art influence the serpents by use of the eye, by touch, and in some cases by whistling. In many instances the snakes are first rendered harmless by extracting the fangs, though this is not done by the more skillful serpent charmers.

SERPENTINE (sēr′pĕn-tīn), a mineral composed of magnesia and silica. It is widely distributed in all parts of the world. Serpentine occurs in all geological ages and forms large beds of primitive rock. The presence of iron and other impurities give it a great variation in color, which ranges through different shades of purple, red, green, yellow, brown, gray, and sometimes marbled and mottled. It takes a high polish, and is used in making ornamental articles, such as vases, boxes, and pillars. Serpentine may be divided into two general varieties, known as common and precious serpentine. The common class occurs as a rock. It is usually soft, is easily broken, and has serpent-like veins. Precious serpentine is the harder and more beautifully colored, but is of quite rare occurrence. Fine deposits of serpentine rock occur near Baireuth, Germany, in the Shetland Islands, Corsica, and many sections of Canada and the United States.

SERPENTS. See **Snakes.**

SERPENT WORSHIP, or **Ophiolatry,** a form of religious worship. It dates from remote antiquity, and is still practiced to a considerable extent in India and among many savage and semicivilized peoples. Serpent worship is considered quite closely associated with tree worship, which, as a form of religion, rose from the fact that most races of mankind at a certain stage of mental development held the view that

trees are the residences or embodiments of spirits or deities. Both are forms of nature worship, against which stern denunciations were made by the Jews, and in classical mythology there is wide mention of sylvan deities, elves, and fairies more or less associated with serpents and trees. Homer mentions the appearance of a serpent at the siege of Troy as an omen of victory to the Greeks, while Plutarch speaks of Alexander as having come from a serpent race. The Zulus of South Africa bring snakes into their homes, giving them the most devoted protection. Many of the American Indians practice serpent worship in various forms. These are only a few instances of many that may be named. The practice of worshiping serpents of different kinds and looking upon them as indicating good or evil, or possessing godlike power, is as old as human history. In India it is connected with Buddhism, even among the higher castes, but as a general rule the practice prevails most extensively among the less intelligent peoples.

SERPULA (sẽr'pû-lȧ), a remarkable genus of sea worms. They belong to the tube order. Their tubes are of calcareous formation, by which they are attached to shells or rocks at the bottom of the sea, and some species live in groups with their tubes intertwined. The animal protrudes its head from the wider end of the tube, but on the slightest alarm withdraws completely into the opening. Many species have been described. Some have highly colored and curiously formed shells. They are extremely sensitive to light, but possess no eyes.

SERUM THERAPY (sẽ'rŭm thĕr'ȧ-pў), the theory in medical practice which relates to the cultivation of antitoxins in the serum of some animals and its application in the treatment of infectious diseases. The blood of a person suffering with an infectious disease is charged more or less with bacteria, and up to a certain stage their development in the patient increases. Bacteria of this class are known as *toxins,* and the active principles that develop in the serum and destroy the bacteria are known as *antitoxins.* Serum therapy is concerned with preventing the contraction of a disease by a patient as well as furnishing immunity against acquiring it.

Considerable progress has been made in developing the theory within the last few years, especially in the treatment of diphtheria. The antitoxin used in combating this disease is obtained from the serum of animals inoculated with cultures of the Klebs-Loeffler bacillus, and it is applied by injecting it hypodermically into the system of the patient. Treatment in this form is given to render persons immune to the disease as well as to destroy the malignant effect of the bacteria in persons already affected. It has been found that the injection is most effective when made between the shoulder blades. The mortality from diphtheria has been reduced by treatment with antitoxin from 9 to 13 per cent., against 35 to 40 per cent. in cases in which other methods are employed.

Formerly serum therapy was limited to diphtheria, but more recently its field has been extended largely with good results. The mortality from cholera among laborers at Calcutta, India, has been reduced 72 per cent. It has been shown that the application of serum in the treatment of typhoid has been efficient in preventing the contraction of the disease, especially in the army of India and South Africa, where less than one per cent. of the inoculated men contracted the malady, while nearly three per cent. of the uninoculated men fell victims to it. Blood serum taken from horses has been employed with considerable success in combating the bacillus of the plague. According to a report of the Bureau of Animal Industry of the United States Department of Agriculture, it has been possible to largely decrease fatality from swine plague and hog cholera by the use of serum. These contagions result fatally in from 70 to 85 per cent. of the cases, but when treated with serum only 20 per cent. of the animals die.

SERVAL (sẽr'vȧl), the name of an animal found in South Africa, classed as a member of the cat family. The body is from three to four feet long, including the tail, which has a length of fifteen inches. The color is tawny with black spots, the back has two longitudinal bands, and the tail is encircled by rings. It is about the size of the lynx, but not so savage, and the skins are known as tiger cat in the fur trade. The serval may be domesticated if taken when young.

SERVETUS (sẽr-vẽ'tŭs), **Michael,** physician and theologian, born near Saragossa, Spain, in 1511; died October 27, 1553. His Spanish name was Miguel Servedo, and he was the son of a notary. He studied law in the University of Toulouse, France, but later devoted his attention to theology. Subsequently he traveled in Germany and Switzerland, where he became acquainted with the leading reformers and their doctrines, some of which he adopted. In 1533 he took up his residence at Lyons, where he studied medicine under the assumed name of Michel de Villeneuve, and subsequently removed to Paris. In the latter city he met Calvin, with whom he arranged for a discussion on theology, but failed to appear at the time appointed. In 1553 he published at Vienne, France, a work entitled "The Restoration of Christianity," in which he advanced doctrines that were distasteful to both the Reformers and the Catholics. Subsequently he was arrested at Geneva, Switzerland, where he was put to trial on charges of blasphemy, materialism, heresy, and pantheism. The decision was to the effect that Servetus should pay a fine and be burned at the stake by a slow fire, unless he declared his retraction. This he declined to do and both he and his books were burned. As

an anatomist he took advanced ground, in that he anticipated the discovery of the circulation of the blood made afterward by Harvey. The name of Servetists was later given to a small party in Switzerland which rejected the doctrine of the Trinity.

SERVIA (sĕr'vĭ-ȧ), a kingdom in the southern part of Europe, in the northwestern section of the Balkan peninsula. It is bounded on the north by Hungary, east by Rumania and Bulgaria, south by Greece, and west by Bosnia and Novibazar. The Drina River forms the western boundary, the Save and the Danube separate it from Austria-Hungary, and it is separated from Rumania by the Danube. The length from east to west is 165 miles, and the breadth from north to south is 150 miles. It has an area of 18,621 square miles.

Description. The surface is generally mountainous, being traversed by ranges of the Carpathian Mountains in the northeast, the Dinaric Alps in the west, and the Balkans in the southeast. The highest elevations are in the Rudnik Mountains, a chain belonging to the Carpathians, which are situated near the center of the country. These highlands have a general elevation of 3,500 feet and culminate in Great Schturaz, height 3,950 feet. Higher altitudes are attained on the southeastern border, where the highlands reach elevations of 7,000 feet above sea level. The country has an abundance of timber, both in the valleys and on the mountain slopes, and the soil is generally fertile. Oak and beech are the predominating forest trees.

The country lies wholly in the basin of the Danube, which carries all the drainage eastward into the Black Sea. Through the central part flows the Morava, the largest interior stream, and its valley contains the largest cultivated area. The Drina, on the western border, receives the inflow from the Jadar. The Timok, which forms part of the boundary of Bulgaria, flows into the Danube. Swampy plains extend along the Save and the Danube in Servia, where the climate is somewhat unhealthful. Rainfall averages 25 inches annually and is sufficient in all sections of the country for the cultivation of crops. In the highlands the climate is considerably colder than in the valleys and lowlands, but as a whole it resembles that of Central Europe rather than that of the region adjacent to the Mediterranean.

Agriculture. Seventy per cent. of the area is productive. Agriculture, though still carried on without modern processes, is the chief industry. Corn is the principal cereal and the chief food of the people. Practically all the farms are small and tilled by the owners. The principal products, besides corn, are wheat, hemp, flax, tobacco, and fruits, especially pears, prunes, grapes, apples, and peaches. A large majority of the farms have a diversified line of interests, such as fruit growing, general farming, and stock raising. Oxen are used extensively as work animals. Other live stock includes cattle, sheep, goats, swine, and horses. Poultry is grown very extensively. The mulberry tree has been planted in large areas as a means of fostering silkworm culture.

Other Industries. Though mining is still in a primitive state, some progress has been made in utilizing the deposits of coal, silver, lead, iron, clays, quicksilver, and building stone, all of which abound in considerable quantities. The chief manufactures are carpets, jewelry, embroidery, hardware, wine, machinery, clothing, and utensils. The exports include cereals, wine, wool, live stock, and lumber, and the imports embrace sugar, cotton, and machinery. Austria and Hungary have the larger share of trade, and next in order are Germany, Russia, and Great Britain. The exports, amounting to $14,500,000 per year, somewhat exceed the imports. Transportation is facilitated by the Danube and tributary rivers and canals. About 300 miles of river navigation is furnished by the Danube, the Drina, and the Save, and 925 miles of railways are operated, all under ownership and control of the government. The telephone, telegraph, and postal systems are efficiently managed.

Government. The government of Servia is a constitutional monarchy and the king holds his office by right of inheritance. He is assisted by nine ministers, but has large powers in executing the laws and filling the functions of supreme ruler. The national legislature is called the *Skupshtina,* whose membership is elected by the people, and in it is vested the power to approve or reject laws proposed by a council of state. All males over twenty years of age are obliged to serve actively in the army for two years and thereafter to drill short periods annually in the reserve. This gives the nation a total war strength of 225,000 men and a regular army of 20,000 men. It has no navy, but a number of the principal towns are strongly fortified. Greek Orthodox is the state religion, and is controlled by the minister of education and public worship. Practically all Servians belong to the state church, but other faiths are tolerated. A national system of education is maintained, and attendance at the common schools is compulsory. Admittance is alike free to all in the institutions of higher learning. The school system includes elementary and secondary schools, with articulated higher institutions, including colleges of agriculture, law, medicine, theology, sciences, and military science.

Inhabitants. The people are Slavs and are known as Serbs or Servians. They are closely related to the Croatians and Slovenes. A large number of these people reside in other countries, including about 250,000 in Montenegro, 1,325,000 in Herzegovina, and 2,340,000 in adjacent states. Belgrade, at the confluence of the Drina and Danube, is the capital and largest city. Nisch, Kragouyévatz, Leskovatz,

and Shabatz are thriving cities. The foreigners include about 35,000 Gypsies and 150,000 Rumanians. Population, 1922, 4,547,990

Language and Literature. The Servian language is sometimes called the Illyrian, and forms one of the four divisions of the Slavonian tongue, but it is more closely allied to Russian than to Bohemian or Polish. Commercial intercourse with the Italians and adherence to the Greek religion have influenced the language by incorporating a number of Italian and Greek terms, but the dialect has been preserved with remarkable distinctness. It has a considerable literature, mostly poetry and works on theology. Among the most eminent of Servian writers is George Brankovitch (1645-1711), who wrote "History of Servia," a work that records the national events from the origin of the nation to his own time. Little advance was made in the culture of the language until Vuk Stephanovitch, in 1814, published his "Grammar of the Servian Language." He gathered the best poetic productions in the Servian and published them under the title of "Songs of the Servian People." A long list of recent writers may be mentioned in law, lyric and dramatic poetry, jurisprudence, history, and theology. The revival of interest is due to the liberation from Turkish rule and a more general spread of education. The Servians are noted for their love of freedom and personal valor, and they comprise one of the most gifted and progressive classes of the Slavonian peoples.

History. The history of the region now occupied by Servia dates from the early historic period of Europe. It was anciently inhabited by Thracian or Illyrian races, who became subject to the Romans shortly before the Christian era, and was formed into the province of Moesia. With the decline of Rome it was successively occupied by the Huns, Ostrogoths, and Lombards. About the middle of the 6th century it reverted to the Byzantine emperors, but in the next century it came into the possession of the Avares. In 638 the Servians moved from the slopes of the Carpathians into Servia and Bosnia, where they became converted to Christianity, and soon after united with the Byzantine rulers to expel the Avares. Their settlements were greatly extended toward the northwest, and about 1060 Michael Bogislav succeeded in expelling foreign claimants and assumed the title of king, receiving at the same time recognition from Pope Gregory VII. Successive wars to maintain independence terminated successfully, and in 1165 Stephen Nemanja founded a dynasty that prevailed two centuries. Stephen Dushan (1336-1356) was the most distinguished monarch of the Nemanja dynasty. He succeeded in defending his dominion against foreign opposition, united under his government the countries of Macedonia, Bulgaria, Thessaly, and Albania, and successfully maintained independence of the advancing Turks. After his death the Turks became more successful, and Lazar I., who had founded a new dynasty in 1375, was not only defeated in the decisive Battle of Kossova in Albania, in 1389, but was slain.

The country kept up a form of independent existence until 1459, when it became a Turkish province under Sultan Mahmud, to remain under Moslem control nearly 200 years.

Milosh Obrenovitch united all of Servia in arms in 1815, and after a long and disastrous war attained victory, being elected prince in 1829. The following year Turkey granted autonomy to Servia and recognized Prince Milosh as hereditary sovereign. He was compelled to abdicate in 1839 in favor of his son, Milan, who was shortly after succeeded by his brother, Michael, but the latter was forced to abdicate in 1842. Alexander Kara-Georgevitch, son of Czerny George, was elected prince, but being a weak ruler he was compelled to abdicate in 1859. Milosh Obrenovitch was recalled, but died soon after and was succeeded by his son, Michael, in 1860, who was assassinated on July 10, 1868, by partisans of Prince Alexander. Milan Obrenovitch, grand-nephew of Milosh, became prince, and in 1876 joined Herzegovina and Montenegro in a war against Turkey, but the Servian forces were defeated at Alexinatz.

In 1877 Russia declared war against Turkey, and after the fall of Plevna, in the same year, the Servian forces rallied to the support of the Russians. The treaty of peace concluded at Berlin on July 13, 1878, gave Servia its independence, and in 1882 a kingdom was erected with Milan I. on the throne. This sovereign abdicated in favor of his son in 1889 and died in Vienna, Austria, February 11, 1901. His son succeeded him under a regency as Alexander I., and on April 13, 1893, took full charge of the government. He was assassinated in 1903, and Peter Karageorgevitch was proclaimed king. In 1913 the country became a leader in the Balkan War, aiding in the capture of Adrianople. The Austro-Germans captured Belgrade in 1914 and by 1915 occupied the entire country. When the Central Powers were defeated, in 1918, Servia was enlarged by the Paris Peace Congress and became a part of Jugo-Slavia.

SERVICE CLUBS, the name used to designate associations which are maintained by business and professional men to promote acquaintance, to stimulate interest in each other, and to cooperate for the welfare of the community. The first of these to organize were the Rotary Clubs, which were founded by Paul P. Harris in Chicago in 1905. This organization had more than 100,000 members in twenty-five countries in 1923. Other organizations belonging to this class include the Lions Clubs and the Kiwanis Clubs, both of which have a large membership in Canada, the United States and other countries.

SERVIUS TULLIUS (sĕr'vĭ-ŭs tŭl'lĭ-us),

the sixth king of ancient Rome, who probably reigned from 578 to 534 B. C. His life is wrapped in fables and traditions. He is generally supposed to have been the son of a slave, but was brought up in the home of Tarquin, whose daughter he is said to have married. He succeeded Tarquin as King of Rome, and is said to have adopted a constitution which made landed property the basis of the military system. In this way he admitted the plebeians to a place in the army and the government. In the latter part of his reign he concluded an alliance with the Latins, constructed several temples, and added the Esquiline, Quirinal, and Viminal hills to the city of Rome.

SESAME (sĕs'ā-mē), a genus of plants, many of which are cultivated for their seeds in Asia and Africa. The common sesame, or *Sesamum indicum,* is of the herb order. It grows to a height of from two to three feet, has opposite leaves, and bears pinkish or yellowish flowers. The seeds are valuable, yielding the so-called *gangli oil.* This product has a sweet taste. It is used for food, lighting, and oiling, and will keep for many years without becoming rancid. It is used in some countries as salad oil and in preparing cosmetics. The leaves of the plant yield a gummy substance used for poultices and in preparing a light drink.

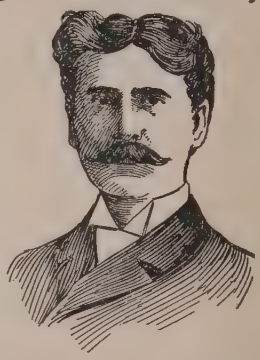
SESOSTRIS (sē-sŏs'trĭs), the name given by the Greeks to a famous King of Egypt, who is supposed to have reigned for 66 years, beginning about 350 B. C. Early Greek writers assert that he divided Egypt into 36 districts and placed his brother as regent over them, and that he personally conducted a vast army into Libya, Arabia, India, Asia Minor, and finally Europe. They assert that he subdued Ethiopia, placed a large fleet on the Red Sea, and made the islands south of Asia subject. Many of the magnificent temples are assigned to him. He is thought to have been the builder of a wall 187 miles long at the border of the Libyan Desert, and of many obelisks or columns, on which historic views of his conquests were engraved. These and other improvements were built by captives that he brought to Egypt from the conquered lands. According to some accounts, he became blind and decrepit in his old age, and took his own life. Some writers identify the exploits assigned to Sesostris as those accomplished by Rameses II., while others regard the name as personifying several consecutive monarchs of Egypt.

SESQUI-CENTENNIAL EXPOSITION. See **Philadelphia.**

SETI I. (sā'tē), King of Egypt, the first ruler of the nineteenth dynasty. He was the son of Rameses I. and ruled for 27 years. During his period were erected many great buildings in Thebes and other cities of Egypt. Inscriptions giving information of his campaign against Syria and Palestine have been discovered at Karnak and elsewhere. He was succeeded by Rameses II.

Seti II., the grandson of Rameses II., was the fourth ruler of the nineteenth dynasty. His tomb is preserved at Biban-el-Moluk.

SETON (sē'tŭn), **Ernest Thompson,** author and lecturer, born at Shields, England, August 14, 1860. He was brought to Canada at an early age, and made his home in the woods from 1860 to 1870. In the latter year he went to Toronto to be educated in the public schools and at the Collegiate Institute. He went to England in 1879, where he studied two years, and came to Manitoba in 1881. The following year he took up his residence on the plains, spending much of his time in Texas and New Mexico. He was made official naturalist to the government of Manitoba in 1891, in which position he rendered valuable service through his extensive knowledge of wild animal life, acquired by actual experience in the woods and on the plains. While many naturalists have criticised adversely various accounts published by him, his lectures and books have induced greater interest and more careful study of the life and habits of animals. Among his books are "Birds of Manitoba," "Biography of a Grizzly," "Art Anatomy of Animals," "Wild Animals I Have Known," "Two Little Savages," "Lobo, Rag, and Vixen," "Animal Heroes," and "Lives of Game Animals."



ERNEST THOMPSON SETON.

SETTER, a breed of dogs originally trained to indicate the presence of game birds by crouching close to the ground, but now usually taught to stand rigid like a pointer. Russian setters have woolly fur and a bearded muzzle, and are noted for their keen scent. The English and Irish setters have narrow muzzles, long ears, silken hair, and a quick, keen eye. The Scotch, or Gordon, setter received its latter name from the Duke of Gordon, who, in 1800, bred a number of these dogs. Its color is a rich black, with tan on the legs, face and chest.

SEVEN PINES. See **Fair Oaks.**

SEVEN SLEEPERS, in legendry, seven Christian youths of Ephesus, who escaped the persecution of Decius by finding safety in a cave. Here they were afterward found by the enemy, who walled up the entrance to the cave with great stones, that the Christian youths might die of hunger. Instead of succumbing to starvation, they fell into a deep sleep, and in future generations they were entirely forgotten. It is supposed that they were inclosed in the cave in the year 251, and were awakened by some shepherds of Ephesus, who were seeking shelter for their cattle, in 447 A. D. One of

their number was immediately sent to buy bread and other articles of food, but on reaching the village he became astonished that the cross had been raised in many places and a different civilization confronted him than he had ever before experienced. On offering to pay the baker with a coin of Decius instead of one bearing the imprint of Theodosius II., who had in the meantime become king, he was placed under arrest, but was released on showing the officers the cave where he and his six companions had slept for 196 years. Theodosius hastened to the spot in order to confirm the report, and was impressed with the truth of the resurrection of the dead. The Seven Sleepers relapsed into a deep sleep immediately after conversing with Theodosius, to be awakened only on the resurrection morn. June 27th has been consecrated to their memory by several Christian churches. A similar legend is current among the Mohammedans.

SEVENTH DAY ADVENTISTS. See **Adventists.**

SEVEN WEEKS' WAR, the name given to the War of 1866 between Prussia and Austria. It was caused by the unsettled conditions in Schleswig-Holstein. Bismarck had wisely planned to consolidate the German states under the leadership of Prussia, and with that end in view concluded an alliance with Italy. When Austria violated the Treaty of Gastian, by which the Schleswig-Holstein question was supposed to have been settled, Prussia was joined by Italy and most of the North German states, while Bavaria, Hanover, Hesse, Saxony, and Württemburg supported Austria. Three armies promptly invaded Austrian territory and defeated an army of Saxons and Austrians in the Battle of Sadowa, or Koniggratz, after which they marched upon Vienna. Archduke Albert, who commanded the Austrian forces in Italy, was compelled to withdraw from Verona to aid in defending the capital. However, the Austrian fleet under Admiral Tegetthoff defeated an Italian fleet under Persano. In the meantime the army of Hanover and the South German states was compelled to surrender, and Austria had no recourse but to sue for peace. The war was ended by the Treaty of Prague, which incorporated Frankfort, Hanover, Hesse, Nassau, and Schleswig-Holstein with Prussia. By its terms Austria ceased to be a member of the Confederation, and special treaties were made by Prussia with Baden, Bavaria, the Grand Duchy of Hesse, Saxony, and Württemburg.

SEVEN WISE MEN, or **Seven Sages of Greece,** the designation applied to a number of Greek sages, who were devoted to the cultivation of practical wisdom. They lived about 620-548 B. C. Writers attribute to them a number of maxims of prudence and morality, but there is no uniformity among the ancients either as to the names or the sayings of these sages. The list of names and characteristic sayings are usually given as follows:

Bias of Priene in Caria—"Too many workers spoil the work."
Chilon of Sparta—"Know thyself."
Cleobulus of Rhodes—"Moderation is the chief good."
Periander of Corinth—"Forethought in all things."
Pittacus of Mitylene—"Know thy own opportunity."
Solon of Athens—"Nothing in excess."
Thales of Miletus—"Suretyship brings ruin."

SEVEN WONDERS OF THE WORLD, the name applied by ancients to seven monuments, all of which possessed remarkable splendor or magnitude. The term originated in Greece after the time of Alexander the Great, and Philo of Byzantium made them the subject of a descriptive work. These structures included the Hanging Gardens of Semiramis at Babylon, the Pyramids of Egypt, the Temple of Diana at Ephesus, the Colossus of Rhodes, the Pharos of Alexandria, the Statue of Jupiter at Athens by Phidias, and the Mausoleum at Halicarnassus.

SEVEN YEARS' WAR, the famous contest for the possession of Silesia. It was waged by Empress Maria Theresa of Austria against Frederick the Great of Prussia, and continued from 1756 to 1763. Silesia had previously belonged to the Austrian dominions, but was annexed to Prussia at the time of the war for succession to the throne of Austria, and in 1756 the empress took advantage of the circumstance that Frederick the Great was opposed by a number of European powers. She formed an alliance with France and Russia, while Frederick was supported by four of the smaller German states and England. The first decisive battles were fought in Saxony in 1756, when Frederick occupied Dresden and other chief cities of that region. The war continued with varying success, Frederick holding out bravely against an immense opposing army, until the death of Empress Elizabeth of Russia, in 1762, when Peter III. ascended the throne. This sovereign was a great admirer of Frederick. He immediately restored East Prussia to him and sent an army of 15,000 men to his assistance, thus turning the tide in favor of Prussia. The last decisive battle was fought at Wilhelmsthal on June 24, 1762, when the French were defeated and surrendered to the allies of Prussia. War was terminated by the Treaty of Humbertsburg on February 15, 1763, which confirmed the title of the Prussian throne to Silesia. A part of this extended war was carried to India and America by the French and English, the latter phase of it being known in American history as the French and Indian War. The result was that France lost all of Canada and decided advantages in India. See **French and Indian Wars.**

SEVERN (sĕv'ĕrn), a river of western England, the second largest of that country, being exceeded only by the Thames. It rises in the mountains of Wales, and, after flowing north-

east to Shrewsbury, it assumes a circuitous course toward the southwest and flows by a wide mouth into Bristol Channel. The total length is 210 miles, of which 180 miles are navigable, and its basin has an area of 8,575 square miles. Extensive improvements have been made to Worcester, and several canals enlarge its commercial importance. It receives the waters from the Tern, Teme, and Avon rivers. The valley is fertile, and is the seat of many manufacturing cities.

SEVERUS (sĕ-vē'rŭs), **Alexander,** Roman emperor, born at Arca, in 205; slain in 235 A. D. He was of Syrian parentage, and originally was named Alexius Bassianus, but was adopted by Emperor Heliogabalus, and assumed the name by which he is known in history. His education was received at Rome, where he attained a wide popularity, and at the death of the emperor, in 222, was proclaimed sovereign by the praetorians and confirmed by the senate. His reign was prosperous and peaceable until he declared war against the Persians in 231, the contest checking Persian advance, but not maturing to the material advantage of the Romans. The Germans invaded Gaul in 235, and he personally commanded the Roman army against them, but was slain in a mutiny by his own men.

ALEXANDER SEVERUS.

SEVERUS, Lucius Septimius, Roman emperor, born in the African town of Leptis Magna, April 11, 146; died Feb. 4, 211 A. D. His family was of the equestrian rank and provided well for his early education. He afterward removed to Rome, where he was made praetor in 178. After commanding the army in Gaul, he became governor of Gallia, Pannonia, and other provinces, and in 193 was proclaimed emperor as successor to Pertinax. However, Didius Julianus had been placed on the imperial throne by the praetorians before Severus reached Rome, but he successively defeated him and other rivals, banished the praetorians, and won the support of Albinus, commander of the Roman forces in Britain, by conferring upon him the title of Caesar. Shortly after he made an extended campaign in the East, which was followed by capturing Byzantium after a three years' siege.

Clodius Albinus became ambitious a second time to occupy the throne of Rome and accordingly organized a force of 150,000 men, but was defeated by Severus with great loss at Lyons in 197. The latter soon after returned to Rome, where he distributed much valuable property secured on his extensive campaigns, but subsequently made a second expedition to the East to repel an invasion of the Parthians and suppress insurrections in Seleucia and Babylonia. He crossed into Egypt from Parthia, where he captured Alexandria, and soon after returned to Rome with a large amount of wealth and gold, which he lavished upon his soldiers and subjects. A rebellion in Britain required him to lead an army across the English Channel in 208, and while on the island marched into Caledonia. To provide a defense against the Caledonians, he built a wall from the Solway Firth to the Tyne River. He died at York three years after entering Britain.

SEVIER (sĕ-vēr'), **John,** soldier, born in Rockingham County, Virginia, in 1745; died Sept. 24, 1815. He descended from French parents and at the age of 16 years became a pioneer on the Holston River, in what is now Tennessee. Here he built Fort Watauga and fought against the Indians. During the Revolutionary War he sided with the Americans, taking part in the Battle of King's Mountain and other engagements. In 1785 he was chosen governor of the State of Franklin, which comprised parts of North Carolina and Tennessee. When this State was broken up and made a part of North Carolina, he was elected to Congress, in 1790. He was elected Governor of Tennessee in 1796 and was several times re-elected, and subsequently served in Congress two terms, from 1811 until 1815.

SÉVIGNÉ (sā-vēn-yā'), **Maria de,** eminent letter writer, born in Paris, France, Feb. 6, 1626; died April 18, 1696. She was a daughter of the Baron of Chantal, who lost his life in the war against England in 1627, and her mother died a few years later. She was trained under her maternal uncle, the abbé of Coulanges, who provided amply for her education, giving her the advantages of a liberal course in French, German, Italian, Spanish, and Latin. In 1644 she was married to the Marquis of Sévigné, a Breton of good family but small estate, who was killed in a duel in 1651. She never married again, though many opportunities of considerable merit were presented, but instead devoted herself to the culture of her two children, a son and daughter. The daughter, Françoise Marguerite, became Madame Grignan in 1669, and accordingly accompanied her husband, Marquis Grignan, to Provence, where he held the rank of lieutenant general. Thus the opportunity for the many letters written by Madame Sévigné was presented. These letters cover the principal events of European history for about 25 years. They are of value alike from the standpoint of history and the charming style in which they are written, and sparkle with remarkable affection, wit, frankness, and careful scrutiny of human character. A complete edition of these writings was not printed until 1726, thirty years after her death.

SEVILLE (sĕ-vĭl'), a city in Spain, on the

Guadalquivir River, capital of the province of Seville, sixty miles northeast of Cadiz. It occupies an imposing site on the east bank of the river, which is crossed by a number of bridges, and is surrounded by walls of Moorish construction. These walls contain 66 towers and may be entered by fifteen gates. Most of the streets are narrow, but in the newer parts considerable improvement has been made by widening them materially and constructing modern forms of architecture. It is an important railroad junction, has substantial pavements in the newer parts, and modern municipal facilities have been introduced to some extent, particularly electric lighting, sewerage, and rapid transit. The chief manufactures are leather, cotton textiles, silk and woolen goods, pottery, tobacco products, machinery, hardware, soap, leather, and utensils. It is important as a port of entry, having a large interior and foreign trade and a moderately spacious harbor.

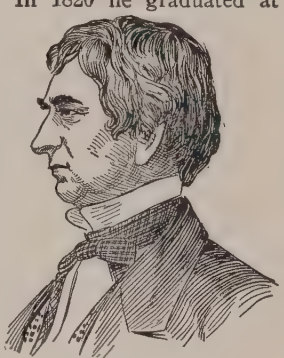
The city is rich in ancient forms of architecture, the most important being a Gothic cathedral, a handsome Moorish palace, and numerous churches, halls, and hospitals. The bull ring is a stone structure with a capacity for 15,000 spectators. It has an aqueduct of 410 arches dating from Moorish occupation. Besides the public schools, it has a large number of convents and academies, several institutions of higher learning, and numerous parks and gardens. The cathedral contains the tombs of Ferdinand, the son of Columbus, and Ferdinand III. of Castile, besides a large number of excellent sculptures, carvings, and an organ with 5,400 pipes.

Seville is an ancient city and was called Hispalis by the Romans. No city of Europe contains finer remains of Moorish art and architecture, and none has a more interesting history. In the later part of the Roman period it rose to great importance, and during Vandal and Goth occupation it served as the capital of southern Spain. It fell into Moorish possession in the 8th century, when it rose to a city of 400,000 people, and in 1026 was made the capital of the Moorish kingdom. Ferdinand III. of Castile conquered it in 1248, but it remained the capital of Spain until the reign of Charles V., when that distinction was transferred to Valladolid. The discovery of America gave it an immense trade with the colonies. At that time it rose to the height of its prosperity, but much of its importance was soon after lost by trade centering at Cadiz. The French under Marshal Soult captured the city in 1810 and inflicted much damage, and in 1843 it was forced to surrender to Espartero. Population, 1905, 150,182; in 1920, 155,366.

SÈVRES (sā'vr'), a town in France, on the Seine River, six miles southwest of Paris. It is noteworthy because of its extensive manufacture of porcelain, being the seat of the large factory removed thence from Vincennes in 1756. Porcelain products of elegant design and beautiful painting are produced here, some of the products being classed among the most valuable in the world. The town was captured by the German army in 1870, when its beautiful porcelain museum was partially destroyed by the bombardment afterward conducted by the French. It was attacked by the troops of the Commune in 1871. Population, 1916, 8,661.

SEWALL (sū'ăl), **Arthur,** shipbuilder and public man, born in Bath, Me., Nov. 25, 1835; died there Sept. 5, 1900. After attending the public schools, he entered the shipyards of his father at Bath, and in 1854 formed a partnership with a brother for constructing sailing vessels. The firm continued business until the death of the elder brother in 1879, when the institution passed to the ownership of Arthur Sewall and his sons. The *Roanoke,* which was the largest wooden ship constructed in the United States, was built at these yards, and at the same place was built the *Dirigo,* the first steel ship completed in America. Sewall was interested in the Bath Iron Works, served as president of the Bath National Bank, and was president of the Maine Central Railroad from 1893 to 1894. He was an active and influential member of the Democratic party and was the nominee of that party for Vice President in 1896, but failed of election.

SEWARD (sū'ĕrd), **William Henry,** statesman, born in Florida, N. Y., May 16, 1801; died Oct. 10, 1872. In 1820 he graduated at Union College and, after taking a law course, entered the practice at Auburn. He was elected to the State senate as a sympathizer with the anti-Masonic movement in 1830, and four years later was defeated for Governor as the Whig candidate, but was elected to that office in 1838 and in 1840. He entered the United States Senate in 1849, where he at once attained to leadership as an orator and opponent of slavery, and as such opposed the admission of Texas as a slave-holding state. When the Republican party was formed, he was among its foremost orators, and in 1860 became a prominent candidate for President in the convention that nominated Lincoln, whom he gave his earnest and hearty support.



WILLIAM H. SEWARD.

President Lincoln appointed Seward Secretary of State and during his term of service, from 1861 to 1869, the important events of the Civil War and of reconstruction took place. Among the notable questions was the Trent Affair (November, 1861), and it was due to

his wise counsel that war with England was averted. He took an efficient part in averting trouble with France at the time Maximilian was executed in Mexico. The purchase of Alaska from Russia, in 1867, is another important event in which he rendered distinguished service. Seward was severely stabbed by one of the conspirators implicated in the assassination of Lincoln on April 14, 1865, his assailant entering the bedroom in which he was confined on account of a broken jaw and arm, an injury received shortly before by being thrown from his carriage. He traveled extensively after retiring from office and is the author of several works. Among his published works are "Life of John Quincy Adams," "Speeches," and an "Autobiography." He delivered eulogiums in the Senate on Webster, Clay. Clayton, Broderick, and Rusk.

SEWELLEL (sē-wĕl'lĕl), the name of a small rodent of North America, found in the Pacific coast region from British Columbia to the northern part of California. It somewhat resembles the beaver, but in size is similar to the muskrat. The tail is short, the eyes are small, the body is plump and heavy, and the color is reddish-brown. These animals live in colonies and lay up food for the winter by collecting ferns and the woody parts of plants. These are carefully dried before being placed in the burrows. Their fur is soft and is used as an article of dress by the Indians.

SEWERAGE (sū'ĕr-åj), the method of collecting and removing refuse matter from dwellings and cities. The removal of waste materials and the disposal of them to the best advantage, or with the least possible liability of causing damage, are questions of vast importance. These problems may be solved only by studious investigation of the conditions existing in the locality affected, and the establishment of adequate sewerage systems involves the expenditure of large sums of money. The utility of supplying sanitary and drainage sewers in large towns and cities is apparent, since convenience and health depend upon removing the impurities. This is necessary in order to prevent them from contaminating the atmospheric air and the soil while in a state of decay.

Two general sewerage systems are constructed. In one class both the surface drainage and the sewage are carried in a combined system, while in the other a double system is provided, one for conveying the sewage proper and the other for rain water and surface drainage. Formerly the combined system was used almost exclusively, and where it now exists additional districts are usually drained on the combined plan, since it is difficult to change from one to the other, but towns and cities putting in entirely new systems generally use the separate plan. The advantage arising from the newer mode of construction is that much larger conduits are necessary to convey rain water and surface drainage than are required for the sewage proper, and in many cases surface water can be carried into natural water courses by inexpensive artificial channels. Sewers vary in size from a small pipe to a tunnel large enough to be traversed in a boat, this depending altogether on the size of the district to be drained and the amount of fall that is afforded by the natural aspect of the region. The most common method of sewerage is simple flow by gravity to the nearest river or body of water, but sometimes the configuration of the surface makes pumping necessary to cause or aid the flow. Where such disposition by either of these methods is impracticable the sewage is sometimes filtered on a large scale or is chemically deodorized, or precipitated, the solid part being used in the preparation of fertilizers.

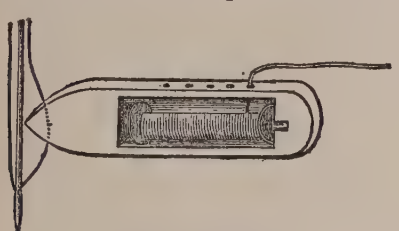
Many of the smaller towns and certain districts in the larger cities employ vitrified clay pipe in constructing sewerage, but where a large quantity of matter must be disposed of tunnels are built of brick or stone. It is aimed to make the system proof against leakage, thus preventing a contamination of the soil, for which purpose sealing of asphaltum or some other material is applied. Sewer pipe is usually from 18 to 36 inches in diameter. It is possible to so construct a system with pipes of this kind that practically all leakage can be overcome and provisions usually are made whereby it can be kept clean by flushing with water. Such a system has the advantage that pipes have a greater carriage capacity for a given size than brick sewers, and they may be easily flushed from automatic flush tanks to prevent the formation of gases, by removing sewage before offensive decomposition has time to begin.

In most American cities the sewerage systems are owned by the cities themselves, but there are some under the control of private companies, as in Galveston, Atlantic City, Phoenix, and about twenty others. In many instances the sewage is discharged into the open sea and is carried away by the tides, in others it is discharged into rivers, and in some the sewage is conducted either through channels or carried by conveyance to special localities and utilized for fertilizing, as is the case in Berlin and other European cities. Private ownership of sewerage is not favored to any great extent, since it is thought that the public health may be better protected under public ownership.

SEWING MACHINE, a machine for sewing or stitching fabrics, leather, paper, and other materials. At present many kinds of these machines are sold in the market, all of them having an important use for one or more particular purposes, and serve useful functions in the manufacture of a large variety of products. Formerly all sewing was done by hand with needle and thread, and the first attempt to construct a machine to serve that purpose sought to imitate the hand movements in sewing. The first in-

vention of this class was made by a German named Charles F. Weisenthal, in 1755, who made use of a double-pointed needle, with the eye in the center, and two pairs of pincers alternately seized the needle and passed it above and below the cloth. This principle was utilized later by Heilmann in constructing an embroidering machine that he exhibited in Paris in 1834. Little progress was made in sewing-machine construction until Elias Howe, of Cambridge, Mass., secured a patent, in 1841, for his *lock-stitch* machine. This stitch is now used in most machines, and the royalty received by Howe from manufacturers amounted to about $2,000,000.

Two threads are used in the lock-stitch, the one being pushed through the cloth by the needle to form a loop at the lower side, while the other is on a bobbin within a shuttle and is carried through the loop, thus forming a stitch that is securely locked and cannot be undone by pulling. Some machines use a *slide shuttle,* as shown in the illustration, others have an oscillating shuttle, and still others employ a rotating hook that serves the same purpose. Previous to the invention of the lock-stitch, Isaac M. Singer invented a machine that made the *chain-stitch,* but this had the disadvantage that the whole seam became undone if one end of the thread was pulled. To overcome this defect he devised a plan to tie a knot in the seam at every eighth stitch by means of an ingenious mechanism. Allan B. Wilson is the inventor of the rotary hook and bobbin long used in the Wheeler and Wilson machine and he also patented, in 1850, the four-motioned feed, which is now used in nearly all machines. Since then innumerable improvements have been



SLIDE SHUTTLE.

made, and machines are employed for purposes so varied that it is impossible to enumerate more than a few of the more important. These include the sewing of ordinary textiles and carpeting. They embrace machines for sewing buttonholes, stitching shoes, sewing gloves, making satchels and mail bags, and hemming the finest textiles. In the larger clothing factories and book establishments machines are operated largely by electric and steam power. Formerly machines for family use were turned by hand after being fastened to a table by set-screws, but now they are generally mounted on a table, and worked by means of a treadle with the foot. Sewing machines of American manufacture are rated among the best and are sold in all the countries of the world.

SEXTANT (sĕks'tant), an instrument used in surveying land and in making nautical observations, especially in measuring the angular distance between two objects. It has superseded the quadrant for observation at sea on account of its greater portability, while for important land surveys the whole circle is preferred. The sextant consists of a frame, usually of metal and ebony, made firm by cross braces. It has an arc of 60° and by the use of two reflecting mirrors, one silvered entirely and the other silvered over half its surface, it includes a range of 120°. Other parts include an eyepiece, a movable arm to carry the fully silvered mirror and a vernier, and a graduated scale of degrees, minutes, and seconds. This instrument was invented by Sir Isaac Newton in 1672, but many improvements have been made. The arc of a sextant used for astronomical purposes is usually made in the form of a complete circle, when the instrument is known as a *reflecting circle.* In this form greater precision in the observations can be obtained.

SEYCHELLES (sā-shĕl'), a group of small islands in the Indian Ocean, about 675 miles northeast of Madagascar. They include about 80 islands and islets, with a total area of 148 square miles. Mahé, the largest of the group, contains 55 square miles. These islands are mountainous, the highest summits being about 3,000 feet above sea level, but coral reefs surround them. The climate is equable, with temperatures ranging from 74° to 88°, and the rainfall is quite excessive, ranging from 90 to 100 inches. Cotton, sugar cane, coffee, rice, tobacco, and fruits are the leading productions. Salt fish, cacao, coffee, and fruits are exported. These islands have been a British possession since 1794, but previous to that time they were colonized by France. Port Victoria, on Mahé, is the seat of government. Only four of the islands are inhabited and the people consist chiefly of Negroes and French Creoles. Population, 1922, 19,834.

SEYMOUR (sē'môr), a city of Indiana, in Jackson County, sixty miles south of Indianapolis. It is an important railroad junction, has a large local and jobbing trade, and is surrounded by a fertile agricultural and dairying country. The principal buildings include the high school, the public library, the Saint Ambrose Academy, and many churches. Electric lighting, pavements, and waterworks are among the improvements. The manufactures include furniture, fertilizer, harness, ice, flour, woolen goods, and machinery. It is the seat of important railroad machine shops. The place was settled in 1852 and incorporated in 1865. Population, 1900, 6,445; in 1920, 7,348.

SEYMOUR, the name of a noble family of England, so called from Saint-Maur in Normandy, whence the ancestors came to England.

In the 13th century they acquired holdings in Monmouthshire and later added to these estates by conquests and by marriage. Sir John Seymour, the head of the family, in 1497, aided in suppressing the Cornish Rebellion. His daughter, Lady Jane Seymour, became the third wife of Henry VIII. in 1537, the day after the execution of Queen Anne. She was the mother of Edward VI. and was prominent as a sympathizer of the Protestant Reformation. Thomas Seymour, fourth son of Sir John Seymour, married Catherine Parr, the widow of Henry VIII. His brother, Edward Seymour, was rapidly promoted and became Duke of Somerset in 1546. Subsequently he was made protector and governor of the king, but became unpopular and was beheaded on Tower Hill in 1851.

SEYMOUR, Horatio, statesman, born in Pompey Hill, N. Y., May 31, 1810; died Feb. 12, 1886. After studying at Hobart College, he entered Partridge's Military School, and later took a course in law. He was admitted to the bar in 1832, and in 1841 entered the New York Legislature as a Democrat. In 1843 and in 1844 he was elected mayor of Utica, and in 1852 became Governor of the State, but was defeated for the same office two years later. He was again elected Governor of New York in 1862, and as such was an efficient officer, but opposed the emancipation proclamation issued by President Lincoln. In 1864 he refused to be a candidate for President. However, he accepted the Democratic nomination in 1868, but was defeated in the election by General Grant. At the election Seymour and Blair received 2,703,600 votes, against 3,013,188 votes cast for Grant and Colfax. He retired from public life soon after, but subsequently was president of the prison association of the United States.

SFORZA (sfôr'tsȧ), **Francesco,** eminent Italian military leader, born in 1401; died March 8, 1466. His father was the Count Alberigo de Barbiano (1369-1424), founder of the Italian family of Sforza, so called from the band of *condottiere,* a class of soldiers noted for their daring. The Sforza family played an important part in the affairs of Italy in the 15th and 16th centuries, not only influencing the government of northern Italy, but also a number of powerful European sovereigns. Francesco succeeded his father in the office of constable of the kingdom of Naples under Queen Joanna II. in 1424, and, as the custom permitted, fought under the sovereigns that gave the largest pay. Owing to skillful discipline and improvement in military tactics, he became recognized as the leading military influence and at various times fought for or against Venice, Florence, Milan, and the Pope. His success brought him into high standing with the Duke of Milan, whose daughter he married, and shortly after he obtained Ancona and Pesaro from the Pope. In 1450 he succeeded to the dukedom of Milan and as duke secured control of all Lombardy, besides a number of possessions south of the Po, while Louis XIV. ceded Genoa and Savona to him. He possessed only a limited education, but patronized learning and encouraged the establishment of schools. Five dukes of the Sforza family succeeded him. Francesco II. (born in 1492) was the last of the line, dying on Oct. 24, 1535, when the possessions of the house passed to Italy.

SHAD, a genus of fish of the herring family, but differing from the herrings proper in having a longer and deeper body and notches in the upper jaw. Writers have described a number of species that are more or less widely distributed and all are esteemed for food. They inhabit the sea near the mouths of rivers and ascend the current in the spring to spawn. The *American shad* is caught off the Atlantic coast from the Gulf of Mexico to Newfoundland and has been successfully naturalized and planted in the Pacific. It attains a length of twenty inches and a weight of two to ten pounds. The best known species of Europe are the *allice shad* and the *thwaite shad.* The former attains a weight of about eight pounds and has fine-flavored flesh, while the latter is smaller, weighing about two pounds, but its flesh is coarser than that of the allice. The shad is bred extensively by the fish commission.

SHADDOCK (shăd'dŭk), a tropical tree of the citrus or orange genus, sometimes called *pompelmoose.* It is cultivated for its fruit. The fruit resembles the orange, having a pale yellow color and a juicy interior of a slightly acid taste. The shaddock is native to Eastern Asia, whence it was brought to America by Captain Shaddock, from whom it was named. Many species have been obtained by propagation, several of which are cultivated in Florida, California, and the West Indies. The *great fruit,* or *pomelo,* bears a fruit about the size of a large orange, while the fruit of the pompelmoose has a diameter of about eight inches.

SHADOW, the obscurity of light within an illuminated region, caused by intercepting the passage of light by an opaque body. The depth of a shadow depends upon the distance from the object upon which it is thrown, since the rays of light, by virtue of the properties of reflection, refraction, and dispersion, incline to bend around the opaque object; thus, an increase of the distance between the object and its shadow proportionately increases this action. Shadows also depend upon the intensity of light, as contrast is decidedly more marked in a strong than in a dim light. It is not infrequent to apply the term *shadow* to an interference of any kind of radiation, as sound shadow and electric shadow. A *sound shadow* is produced by any object that prevents the free passage of sound waves, as the interposition of a wall between the source of the sound waves and the ear. *Electric shadows* are produced in the same

way, but it must be borne in mind that interposed objects have a varying effect. For instance, glass forms no material obstruction to light, but interferes with the radiation of heat, while a stone or brick wall obstructs sound waves, but does not hinder the free passage of an electric current.

SHAEFFER, Nathan C., educator and writer, born in Maxatawny, Pa., in 1849. He studied in Franklin and Marshall College, after which he pursued advanced and special courses in the universities of Leipsic, Berlin, and Tübingen. After returning to his native State, he became principal of the Keystone State Normal School, in 1875, where he did much to advance professional training among the teachers. In 1893 he was elected State superintendent of public instruction, serving until 1909. In the meantime he was a member of the Commission of Industrial Education and held other important positions in educational associations. For some years he was editor of the *Pennsylvania School Journal* and of *Bible Readings for Schools.* He published "Education in Pennsylvania" and "Thinking and Learning to Think."

SHAFTER (shăft'ẽr), **William Rufus,** general, born at Galesburg, Mich., Oct. 16, 1835; died Nov. 12, 1906. His father was a farmer and sent him to the public schools. He entered the Union army as lieutenant in 1861 and distinguished himself in the campaigns under McClellan in Virginia. In 1864 he was made colonel of volunteers, in 1865 was breveted brigadier general, and in 1886 entered the regular service. He was promoted to the rank of brigadier general in 1897 and put in command of the department of California, serving until the beginning of the Spanish-American War, when he was made major general of volunteers and commanded the first expedition to Cuba. In May, 1898, he proceeded to Tampa, Fla., and in June he landed with 16,000 men at Daiquiri, Cuba, whence he advanced toward the heights of El Caney and San Juan, and a few days later received the surrender of General Linares with an army of 20,000 men. Subsequent to the war he commanded the department of the East, but was transferred to the departments of California and the Columbia in 1899. He retired in 1901 with the rank of major general in the regular army.

SHAFTESBURY (shăfts'bẽr-ĭ), **Anthony Ashley Cooper,** statesman, born in Dorsetshire, England, July 22, 1621; died January 22, 1683. He studied at Exeter College, Oxford, and was elected to the Short Parliament in 1640. Though a supporter of the king, he joined the Parliamentary party, and became a member of the council of state under Cromwell in 1653. He soon opposed the Protector and favored the restoration of Charles II., who afterward made him Privy Counselor and later Chancellor of the Exchequer. In 1663 he was made a grantee of the Province of Carolina and became the First Earl of Shaftesbury in 1672. Becoming unpopular with the court party, he was dismissed from the council. In 1681 he was imprisoned on a charge of high treason, but no true bill was found by the grand jury, hence he was acquitted. Later he fled to Holland on account of being implicated in treasonable plots. Dryden's "Absalom and Achitophel" is a satire on Shaftesbury, who is the Achitophel of this production. Ashley and Cooper rivers in South Carolina were named from him.

SHAG, the name frequently applied to several species of the cormorant. It has special reference to the bird which is known as the *crested cormorant,* which has a crest of feathers. See **Cormorant.**

SHAGREEN (shà-grēn'), a kind of leather or parchment prepared from the skins of horses, camels, and other animals. The skins are first cleared of the hair and scraped, after which they are stretched on a frame and covered with the seed of the goosefoot. After moistening and covering with a felt, pressure is applied to sink the seeds into the skins. Subsequently they are shaved down to the level of the depression thus made, and afterward the compressed parts are made to swell by soaking. Prepared in this way, the leather has a peculiar granular appearance, which is often imitated in a common style of bookbinding cloth. It is frequently dyed red with cochineal or green with sal ammoniac and copper filings. A kind of shagreen is made from the skins of various fishes covered with closely set papillae, such as the sharks, rays, and others. These skins are prepared like parchment and are finished by dyeing and smoothing. This class is used in making cases for spectacles, watches, cigars, and edged instruments.

SHAH JEHAN (shä jẹ-hän'), the title assumed by Khorrum Shah, fifth Mogul Emperor of Delhi. The date of his birth is uncertain, but it is known that he was employed in military expeditions against the Mohammedan states of the Deccan in the reign of his father, and that he entered a rebellion against his father in 1623. On the death of the latter, in 1627, he at once ascended the throne. It may be said the empire had reached its greatest security at the time of his accession, but his reign was in the main successful, though warlike. After conquering the Deccan kings, he annexed the kingdom of Ahmadnagar in 1631, subjected Bijapur and Golconda in 1636, waged a long contest against the Uzbeks of Balkh, and made two unsuccessful attempts to expel the Persians from Kandahar. His reign became celebrated because of his remarkable sagacity, and he is remembered by many magnificent buildings that have been preserved to the present time. He is the founder of Delhi, where he caused the erection of the celebrated peacock throne, costing about $34,500,000, built the Pearl Mosque and the Taj Mahal at Agra, and a number of other structures of great beauty. His son,

Aurungzebe, deposed him in 1658, and his death occurred in December, 1666.

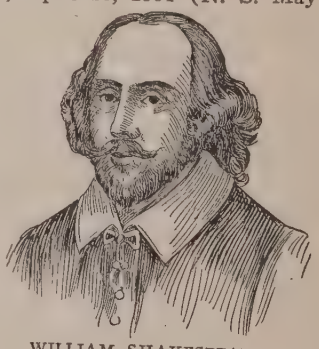
SHAHJEHANPORE (shä-jŭ-hän'pŏŏr), or **Shahjahanpur,** a city of India, in the Northwest Provinces, 96 miles west of Lucknow, with which it is connected by railroads. It is situated on an imposing site near the Gurrah River, contains a number of stately mosques and castles, though these are largely in ruin, and is the center of a large export trade. An American Methodist mission station is located here, by which a number of schools and churches are maintained. Large quantities of sugar, cereals, and live stock are produced in the vicinity. The city was founded in 1647 by Shah Jehan, in whose honor it was named. Population, 1922, 78,963.

SHAKERS (shāk'ĕrz), a communistic religious sect, whose official title is United Society of Believers in Christ's Second Appearing. It had its beginning in Manchester, England, where it was first advocated by Ann Lee. She married a blacksmith at an early age and had four children, who died in infancy, and it is perhaps due to this circumstance that she became an advocate of celibacy instead of the marriage state. Her first connection with ministerial work followed soon after coming in contact with Jane Wardlaw, the wife of a tailor, who professed to be a prophetess and that she had received a call to testify to and spread the truth. The Wardlaws were originally Quakers. Claiming a special revelation in regard to the second coming of Christ, they became estranged to some tenets of that faith and found an able advocate in Ann Lee.

The chief doctrine preached by these people was that the end of all things is near at hand, and that Christ would appear in the form of a woman and reign upon the earth. The meetings held in various parts of England attracted such crowds that the Wardlaws and Ann Lee were imprisoned, and, after being released, the latter claimed to have received the important revelation that she had been accepted as the female of Christ. Hence she became recognized as the head of the Shakers and was called Mother Lee. She claimed to be the bride of the Lamb and that she was the queen mentioned by David in the Psalms, but these pretensions were met with ridicule. Subsequently she claimed to have received a revelation to the effect that America was to be the foundation of the coming kingdom and that she and her followers should seek a home there. Accordingly she and seven disciples came to New York, and in 1774 made a settlement at Watervliet, near Albany. Subsequently many other settlements were made.

Among the chief tenets held at present by the Shakers is the dogma that the old law has been abolished and the new dispensation has begun. They believe that the Holy Ghost makes immediate revelations to mankind, that the kingdom of God is now at hand and intercourse between earth and heaven has been restored, that man is freed from all errors except his own and the sin of Adam is atoned, and that heaven is in fact upon earth and will be brightened into its primeval state by labor and love. They hold several tenets in common with the Quakers and with them object to taking oaths, reject sacraments, and refrain from the complicated courtesies of society. Jesus Christ is regarded a divinely inspired man, representing the fatherhood of God, while Ann Lee was inspired to reveal to mankind the motherhood of God. Worship is conducted in churches, in which the worshippers step in uniform movements while singing hymns and listen to discourses on doctrine and duty. Celibacy is observed strictly. The society is recruited mostly by young men and girls, but married persons may join, who on entering are enjoined to live as brother and sister. The Shakers are noted for their industry, the men engaging in gardening, farming, building, and various arts, while the women attend to the work of education and household duties. All property is held in common and at present is valued at $10,000,000. The organization has sixteen churches and a membership of 1,650 persons. The members are divided into about thirty families, ranging from five to one hundred persons in each, but the Mount Lebanon, N. Y., society is by far the most important. Most of the communities are in the New England states, but there are families of Shakers in Ohio, New York, Georgia, and Kentucky.

SHAKESPEARE (shāk'spēr), **William,** eminent poet and dramatist, born in Stratford-on-Avon, England, April 23, 1564 (N. S. May 3); died April 23, 1616. Though the most famous writer in English literature, his authentic biography is very brief. His parents, John Shakespeare and Mary Arden, daughter of Robert Arden of Wilmecote, had eight children, four sons and four daughters, of whom he was the third child. His father was high bailiff of Stratford, where William probably attended the grammar school, but his early education was necessarily limited, for the reason that his parents had little education and his father was obliged to take him out of school because of having failed financially. He was soon after apprenticed to a butcher, worked as a lawyer's clerk a short time, and in 1582 married Anna Hathaway, the daughter of a yeoman in the town of Shottery,



WILLIAM SHAKESPEARE.

near Stratford. Shakespeare was then only eighteen years of age and his wife was eight years older, this fact being ascertained from the date on her tombstone. Three children were born to this union, a son and two daughters. Susanna was born in 1583. They had twins in 1585, the son being named Hamnet and the other daughter, Judith. The son died in his thirteenth year and the two daughters outlived their father.

Little is known of the early married life of Shakespeare and no definite reason has been assigned why he abruptly left Stratford in 1586 to take up his residence in London, but there is a legend that he and several young companions had at one time robbed the deer park of Sir Thomas Lucy of Charlecote. For this he was seized, brought before the esquire and punished, and in retaliation he wrote a satirical ballad and attached it to a gate of Charlecote. Matters were made decidedly worse by this conduct and Shakespeare sought refuge in London, where he earned his livelihood by holding horses at the doors of theaters, but his wit attracted the notice of actors and finally caused him to be employed as a player and dramatist. However, it is more probable that he developed considerable skill as a writer and formed the acquaintance of players from London, who visited Stratford, and was induced by them and by the necessity to provide for the support of his family to seek his fortune in the city.

He rose rapidly as a favorite member of the dramatic company, which was the most respectable and the most prosperous of that time. The most authentic account of his early success is secured from the attacks of disappointed rivals, the most noted being a pamphlet written by Robert Greene, in 1592, and soon after published by Henry Chettle. In this he was accused of weakness and plagiarism, but it provoked such criticism that Chettle made an apology for publishing it, using these words: "I am as sorry as if the originall fault beene my fault, because myself have seene his demeanor no less civill than his exclent in the quality he professes: besides, divers of worship have reported his uprightness of dealing which argues his honesty, and his felicitous grace in writing that approves his art."

Shakespeare is much more eminent as a playwright than as an actor, though he played successfully before the nobles and Queen Elizabeth, complimenting the latter in his "Midsummer Night's Dream." His first poetic production was published in 1593, entitled "Venus and Adonis," which he dedicated to Henry Wriothesly, Earl of Southampton, whom he called "the first heir of my invention." The following year he published the "Rape of Lucrece," and from that time his fame and fortune were assured. He soon became a shareholder in the theater, bought a substantial house for $300 in 1597, and in 1602 purchased 107 acres of arable land at Stratford for $1,600. The acquisition of this and other valuable property brought him the style and title of William Shakespeare, Gentleman of Stratford-on-Avon, but it is certain that he did not leave the stage of London until after 1603, for in that year he occupied a place in the list of actors in Ben Jonson's play, entitled "Sejanus." He was a man of fine form and features, and enjoyed the intimate friendship of many eminent men of letters and high rank, among them Queen Elizabeth, James I., and Ben Jonson. His writings show a remarkable acquaintance with nature and human character, and have had a wide influence upon the English language. He stands as a central sun among the authors of England and his writings have been translated freely into many languages.

According to a popular story, but which was not mentioned until about fifty years after his death, the poet was visited by his friends Drayton and Ben Jonson. They met at a tavern in Stratford, where the three are said to have "drank too hard, for Shakespeare died of a feavour there contracted." The parish register states that the funeral of "Will Shakespeare, gent." occurred on April 25, 1616. He was buried in the chancel of the church in Stratford, where a slab bears the inscription:

> Good friend for Jesus sake forbeare
> To digg the dust enclosed heare:
> Bleste be the man that spares these stones,
> And curst be he that moves my bones.

These lines are said to have been written by Shakespeare a short time before his death, but their authorship is not certain. However, they have prevented a removal of the remains to Westminster Abbey.

The writings of Shakespeare may be divided into three classes, historical, semi-historical, and fictitious. His *historical* productions include "Henry VI.," "Richard II.," "Richard III.," "King John," "Henry IV.," "Henry V.," and "Henry VIII." The *semi-historical* embrace "Titus Andronicus," "Hamlet," "King Lear," "Macbeth," "Julius Caesar," "Antony and Cleopatra," "Coriolanus," and "Cymbeline." Among his *fictitious* writings are "Love's Labor's Lost," "Comedy of Errors," "Two Gentlemen of Verona," "A Midsummer Night's Dream," "The Merchant of Venice," "Romeo and Juliet," "Much Ado About Nothing," "Twelfth-night," "As You Like It," "Taming of the Shrew," "Pericles," "Merry Wives of Windsor," "Measure for Measure," "All's Well that Ends Well," "Timon of Athens," "Troilus and Cressida," "Othello," "Winter's Tale," and "The Tempest."

SHALE, a class of rock, so named from its tendency to scale into thin sheets. These rocks were formed from sediments deposited by waters and afterward hardened, and are found in any age depositing silt that has not been disturbed by metamorphic action. A wide range is found in the color and composition of

shale. Among the chief kinds are the calcareous, sandy, carbonaceous, and bituminous. The last mentioned yields naphtha, alum, paraffin, and other oils of importance commercially. Many finely preserved fossil remains are found in shales, especially those occurring with coal deposits.

SHALER (shā'lẽr), **Nathaniel Southgate,** geologist, born in Newport, Ky., Feb. 22, 1841; died April 10, 1906. He studied at the Lawrence Scientific School of Harvard University, in 1862, and joined the Union army for service in Kentucky. In 1864 he was made instructor of zoölogy and botany in the Lawrence Scientific School, but resigned to become professor of paleontology in Harvard University in 1867. This position he held until 1887, when he was made professor of geology. For some time he was director of the geological survey in Kentucky. His books include "Nature and Man in North America," "Aspects of the Earth," "A Study of the American Commonwealth," "The Interpretation of Nature," "Sea and Land," "The Individual: A Study of Life and Death," and "The United States of America."

SHALMANESER (shăl-mȧ-nē'zẽr), the name of several kings of Assyria. Shalmaneser I., born about 1312 B. C., began to invade the western part of Asia and removed his capital from Asshur to Calah, south of the city of Nineveh. The second of these kings, Shalmaneser II., conquered the country as far as Lebanon. In 842 B. C. he made the Israelites, who were then governed by Jehu, tributary to Assyria. Shalmaneser IV. succeeded Tiglathpileser in 727 B. C. Hosea, King of Israel, refused to pay tribute to him in 725 B. C., hence he invaded and destroyed that state. Later he laid siege to Samaria for three years, after which it was captured and many of the treasures were removed to his own capital.

SHAMANISM (shä'măn-ĭz'm), the religion of a large number of people in Asia and the eastern part of Europe, usually classed with idol worship. Though it has no fixed idols, it embraces a number of fetishes and ancestral images. The priest, known as the *Shaman,* has charge of certain ceremonies, such as sacrifices and incantations. These are practiced for the purpose of securing oracles and to purify the houses from defilement. The Shamanists believe in one God, whom they worship as the Supreme Being, and they hold to the view that the evil spirits of the lower world are sufficiently powerful to injure man, hence they regard it necessary to use magical rites and spells to avert their harmful influences. Shamanism is practiced most extensively in the northwestern part of Asia and the adherents consist chiefly of Tunguses, Turks, Finns, Hungarians, and Mongolians.

SHAMOKIN (shą-mō'kĭn), a borough of eastern Pennsylvania, in Northumberland County, about twelve miles south of Danville, on the Pennsylvania and the Philadelphia and Reading railroads. The surrounding country produces cereals, fruits, and anthracite coal. The noteworthy buildings include the public library, the high school, a parochial school, and many fine churches. Waterworks, electric railways, and sanitary sewerage are among the improvements. Among the manufactures are powder, earthenware, machinery, cigars, and dairy products. It was platted in 1835 and incorporated in 1864. Population, 1920, 21,204.

SHAMROCK (shăm'rŏk), a plant bearing three leaflets, held memorable as the national emblem of Ireland. Some think it is the wood sorrel, but the white clover is the one more generally used. It is said that Saint Patrick selected a trefoil plant, that is, one having a three-parted leaf, to illustrate the doctrine of the Trinity, hence the shamrock was made the national emblem. The plant commonly sold in Dublin on Saint Patrick's Day, March 17, is the yellow trefoil. A green-colored imitation is sold on that festival in many cities of America.

SHAMYL (shăm'ĭl), or **Schamyl, Samuel,** military leader of the Caucasus tribes, born at Aul-Himry, in the Russian government of Daghestan, about 1797; died in Medina, Arabia, in March, 1871. After studying Arabian grammar and philosophy under the Mollah Jelaleddin, he became a leader of a Mohammedan sect and united a large Caucasian force against the Russians. The tribes of Daghestan soon recognized him as imam, or chief, and by skillful organization he succeeded in defeating a Russian army in 1837. His forces were defeated at the fortress of Akulgo and it was thought that he was among the slain, but he soon after reorganized and continued operations as a formidable opponent to the Russians until 1859, when he was surprised and captured on the plateau of Ghunib, where he had built a fort. The Russians carried him to Saint Petersburg, where he was treated kindly by the czar, who assigned him a residence at Kaluga and an annual pension of $5,000. In 1870 he went on a pilgrimage to Mecca as a parole prisoner, but died the following year.

SHANGHAI (shăng-hä'ĭ), a seaport city of China, on the Hwangpoo River, twelve miles from the mouth of the Yangtse-kiang. The city is divided into two parts, the Chinese city proper and the portion occupied by foreigners. Walls 24 feet high inclose the Chinese part of the city, which may be entered by six gates. Many of the streets are quite narrow and dirty, while the architecture is generally of an inferior kind. The part of the city occupied by foreigners lies north of the Chinese walls. It is well paved, is lighted by gas and electricity, and has numerous other modern facilities, including rapid transit. Many nationalities are represented in the part occupied by foreigners, but the majority are Italians, Americans, Ger-

mans, English, and French, and the government of this portion of the city is distinct from that of the Chinese part. It has a number of excellent buildings, including a fine cathedral, consular and municipal offices, hospitals, churches, and several educational institutions.

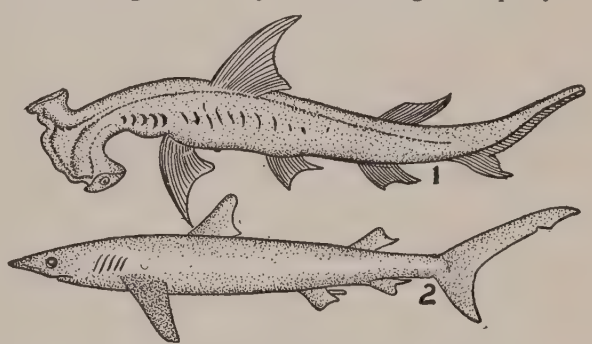
Shanghai has manufactures of clothing, wearing apparel, sailing vessels, earthenware, utensils, fans, and textiles. The harbor is safe and commodious, having many extensive quay improvements and dry docks. It has an immense interior and foreign trade in rice, silk, tea, cotton, hemp, wheat, paper, sugar, chemicals, fruit, oils, tobacco products, wool, metals, and opium. A large share of the export trade is transacted with America, Japan, Germany, Great Britain, France, and Russia. The total annual value of the export and import trade is about $275,000,000. Shanghai dates from remote antiquity, but its importance as a trade center began in 1843, when it was opened as one of the five treaty ports and for unrestricted settlements. The first railroad of China was opened here in 1876, but it was soon after purchased and torn up by native authorities. Population, 1922, 1,540,850.

SHANNON (shăn'nŭn), the largest river in Ireland, which rises at the western base of the Cuilcagh Mountains, and after a southwesterly course of 250 miles enters the Atlantic Ocean. It flows through a number of loughs or lakes, among them Allen, Doburg, Bofin, Ree, and Derg, and from Limerick it forms a broad estuary 70 miles in length. The Shannon is navigable for large vessels to Limerick and for small craft as far as Athlone. It is connected with Dublin by two canals. Among its affluents are the Suck, Foyle, Fergus, and Brosna.

SHANS (shänz), or **Laos**, a group of native tribes occupying a region of Asia that lies between China, Siam, and Burmah, and who maintain a semiindependent form of government. The Shans and Laos are closely related to the Siamese. They so nearly resemble each other that little distinction is usually made between them. They are early descendants from the Chinese, their ancestors having settled in the valley of the Irrawaddy about the 6th century. The region occupied by them is formed of numerous fertile valleys which contain productive fields and valuable forests, while the intervening ridges are noted for their deposits of petroleum, copper, coal, gold, silver, and other minerals. Their country embraces a number of states, which are governed by a chief and a council, the northern states being tributary to Burmah and the southern to Siam, but there is a considerable Shan population in the adjoining region of China. The people are skilled as manufacturers of jewelry, metalware, carpets, and various textiles. They carry on a considerable trade in these products, timber, and live stock. The Shans are quite industrious, giving marked attention to the cultivation of rice, sweet potatoes, the poppy, maize, melons, pepper, and fruits. They are adherents to the Buddhist faith. Serfdom is an extensive institution and slavery of a mild form exists in some of the states. Xieng Mai is the principal city and the chief center of political influence. The Shan population included in Siam is estimated at 1,500,000. Probably an equal number resides in China and Burmah.

SHARI (shä'rē), a river of Central Africa, the most important flowing into Lake Tchad. It rises north of the Congo Free State by several branches and, after a course of 700 miles toward the northwest, enters the lake by several mouths. The Shari flows through a region containing fine forests. In its vicinity are many wild animals, such as birds and hippopotami.

SHARK, an extensive genus of fishes of the ray family, found widely distributed in the ocean, but most abundantly within the tropics. The body is elongated in most species, the tail is thick and fleshy, and the teeth are generally large, sharp, and formed for cutting. The skin is scaleless, but usually is very rough with thornlike tubercles, and is used in making shagreen. They swim with great rapidity at



1, Hammerhead Shark; 2, Great Blue Shark.

long distances, often pursuing ships for the sake of securing the offal and waste materials thrown overboard. Some deep-sea species attain an enormous size and are noted for their voracity in devouring other forms of sea life. All species are more or less destructive of food fishes and do immense damage to the fisheries. The most powerful of the man-eating sharks is the *white shark*, or *man-eater*, of the warm seas. It is found in the waters off the southerly coasts of the United States, where it attains a length of forty feet. It scents food for some distance and is readily attracted by blood or decomposing bodies. Other large species of sharks are the *tiger shark*, the *blue shark*, the *hammerhead shark*, and the *common dusky shark*. The flesh of some species is eaten, the liver yields an oil, and the hide is serviceable in polishing fine-

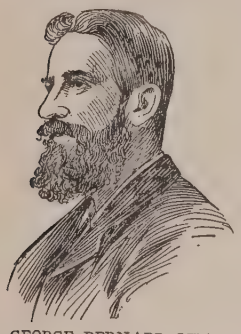
grained wood and in covering the hilts of swords to make the grasp firmer.

SHARON (shâr'ŭn), a borough of Pennsylvania, in Mercer County, on the Shenango River, 75 miles northwest of Pittsburg. It is on the Erie, the Pennsylvania, and the Lake Shore and Michigan Southern railroads. Large interests are vested in coal mining and iron manufacturing. The principal buildings include the high school, the public library, the Hall Institute, and the Saint Scholastica Academy. Among the products of the factories are flour, boilers, nails, lumber products, furnaces, and machinery. Sharon was settled in 1795 and incorporated in 1841. Population, 1920, 21,747.

SHARPSBURG (shärps'bûrg), a borough of Pennsylvania, in Allegheny County, five miles northeast of Pittsburg, on the Allegheny River. It has communication by the Pennsylvania and the Pittsburg and Western railroads and is surrounded by a productive coal and iron mining region. The manufactures include brick, glass, machinery, and lubricating oil. Electric lighting, waterworks, and a public library are among the public utilities. It has several fine public schools and churches. The region was first settled in 1826 and the borough, so named from James Sharp, was incorporated in 1841. Population, 1920, 8,921.

SHASTA (shâs'tà), **Mount,** an elevated peak of California, near the northern boundary of the State in the Sierra Nevada Mountains. It has a height of 14,380 feet. Mount Shasta is an extinct volcano and has several craters, the largest of which is 2,500 feet deep and a mile in diameter. Other features include several glaciers, a number of hot springs, and an abundance of snow at the summit. The lower slopes are well wooded.

SHAW, George Bernard, author and dramatist, born in Dublin, Ireland, July 26, 1856. He studied in his native city and removed to London in 1876, after which he devoted his attention to literary work. His first writings consisted chiefly of criticisms of the fine arts, but he soon took up a journalistic career, engaged in politics as a Socialist, and became noted as a platform speaker. He contributed to the *World* and the *Saturday Review,* writing many articles of interest on the drama for the latter periodical. Among the novels are "Love Among the Artists," "An Unsocial Socialist," and "The Irrational Knot." His plays include "The Admirable Bashville," "Man and Superman," "Three Plays for Puritans," and "Plays Pleasant and Unpleasant." Other writings of interest are "The Quintessence of Ibsenism," "The Perfect Wagnerite," "Major Barbara," and "The Common Sense of Municipal Trading."



GEORGE BERNARD SHAW.

SHAW, Henry Wheeler, humorist, best known as *Josh Billings,* born in Lanesboro, Mass., April 21, 1818; died in Monterey, Cal., Oct. 4, 1895. His father, Henry Shaw, was a member of Congress from 1818 to 1821 and after giving him the advantages of a common school education, he provided for his entrance into Hamilton College in 1832. The son soon left college to become a deck hand on an Ohio River steamboat, and afterward engaged in farming and as an auctioneer. He settled in Poughkeepsie, N. Y., in 1858, and the following year published his popular "Essay on the Mule" over the nom de plume *Josh Billings.* Soon after he went upon the platform as a lecturer, delivering his addresses in an awkward, backwoods dialect, which he also utilized in his writings. Among his published works are "Josh Billings' Farmers' Allminax," "Josh Billings on Ice," "Josh Billings' Spicebox," "Josh Billings, His Sayings," and "Josh Billings' Complete Works."

SHAW, Leslie Mortier, public man, born in Morristown, Vt., Nov. 2, 1848. After attending the public schools in his native State, he removed to Iowa, in 1869, and later graduated at Cornell College and at the law department of the University of Iowa. Soon after he built up a successful practice at Denison, Iowa, where he invested extensively in real estate and became interested in banking. In 1896 he was prominent as an advocate of the gold standard and the election of McKinley, and was elected Governor of Iowa the following year and re-elected in 1899. President Roosevelt made him Secretary of the Treasury in 1902 to succeed Lyman J. Gage, who resigned from the Cabinet in that year. He resigned from the Cabinet in 1908 to become engaged in large financial projects in New York City and elsewhere.

SHAWL, a garment or wrap worn as an outside covering of the person, generally used by women, but in some countries also by men, as among the Scotch Highlanders. Garments of this class have been used as apparel from remote antiquity, but they were not generally introduced until about the middle of the 16th century, when the celebrated cashmere shawls became an important article of commerce. They are usually made of a square of cloth or as a large, broad scarf, and the materials consist of wool, cotton, silk, hair, lace, or a mixture of fibers. Cashmere shawls made of the under wool of the cashmere goat of Tibet were the first worn in Europe, and their designs have been imitated in woven shawls. The cashmere shawls made in Tibet and India are often valued as high as $1,500, the price being high because of the fine material used and the work being done with the greatest care by hand, some

requiring six months or more for completion. At present there are extensive manufactories producing shawls in Canada and the United States, particularly at Lowell, Mass., and other cities of the eastern and middle states. They are an important product in many countries of Europe.

SHAWNEE (shą-nē'), a city of Oklahoma, in Pottawatomie County, 38 miles southeast of Oklahoma City. It is on several surfaced interstate highways and the Chicago, Rock Island and Pacific, and the Atchison, Topeka and Santa Fé railroads. The surrounding country is fertile, producing cereals, grasses, and fruits. Among the noteworthy buildings are the high school, the public library, and many churches and business houses. It has a large trade in live stock, grain, and merchandise. The industries include grain elevators, stock yards, cotton-seed oil mills, and machine shops. Population, 1907, 10,955; in 1920, 15,348.

SHAWNEES, an Indian tribe of North America, belonging to the Algonquin family. They were driven westward from New York by the Iroquois, but joined the French against the English, and later aided Pontiac until the peace of 1786. Subsequently they took part in the Miami War, but were reduced by General Wayne and concluded peace in 1795. In 1812 a part of the tribe joined the English, but later they moved to Missouri and finally to Kansas, whence a number entered Indian Territory, now Oklahoma, in 1854.

SHAYS (shāz), **Daniel,** leader of Shays' Rebellion, born in Hopkinton, Mass., in 1747; died in Sparta, N. Y., Sept. 29, 1825. He entered the continental army at the beginning of the Revolutionary War and attained to the rank of captain. After independence was secured, he became the leader of a party in Massachusetts that demanded redress from high taxes and public expenditures. In 1786 he was chosen to lead 1,000 insurgents, who appeared at Springfield to prevent the session of the supreme court, and the following year made an attempt to capture the continental arsenal. The State in the meantime raised a militia of 4,000 men under Gen. Benjamin Lincoln, which attacked Shays near Springfield on Jan. 25, 1787, and quickly routed his forces. Three insurgents were killed and one was wounded, while the main body fled to Amherst, where 150 were captured and the rest dispersed. A number were sentenced to be hanged, but later a general pardon was granted, and Shays received a pension in his old age for service rendered in the Revolution.

SHEAFFE, Sir Roger Hale, soldier, born in Boston, Mass., July 15, 1763; died July 17, 1851. He joined the British army in 1778 and subsequently removed to Canada as a Loyalist. In 1799 he entered the service in Holland, but soon returned to Canada, where he commanded the British forces at the Battle of Queenstown, after the death of General Brock. For his efficient service in this engagement he was made a baronet. In 1813 he defended York (now Toronto) against the Americans and in 1828 was promoted to the rank of a general.

SHEARS, an instrument used for cutting various materials, such as cloth, cardboard, and metal. It consists of two blades, commonly with bevel edges and connected by a pivot, or has blades joined to a spring handle. Small instruments of this kind are usually called *scissors* and are intended for cutting thinner or finer substances. The wool is cut from sheep by means of shears. Instruments of this kind intended for cutting heavy rods or metal flakes are operated by steam or electric machinery.

SHEARWATER (shēr'wą-tēr), or **Hagden,** a genus of web-footed birds of the petrel family, found widely distributed over the seas. They are about the size of a pigeon, have a brownish color above and white beneath, and are usually seen at no great distance from land, to which they resort only in the breeding season. A single white egg is laid in a hole under ground and the young are clothed with thick, long down. Among the different species are the *sooty shearwater* of the North Atlantic, the *great shearwater* of Greenland and Iceland, the *manx shearwater* of Western Europe, and the *dusky shearwater* native to the West Indies. The young are usually fat and considered a favorite food. The great shearwater is about 20 inches long and has an alar extent of 45 inches. It associates with the fulmars and in walking has the shambling movement of the duck.

SHEBOYGAN (shĕ-boi'gąn), a city in Wisconsin, the county seat of Sheboygan County, 50 miles north of Milwaukee. It occupies a fine site on Lake Michigan, near the mouth of the Sheboygan River, and has communication by the Chicago and Northwestern Railroad. Lines of steamboats communicate with the leading ports on the Great Lakes. Among the principal buildings are the county courthouse, the Federal building, the public library, the Saint Nicholas Hospital, the Sheboygan Home for the Friendless, an insane asylum, and Lutheran and Roman Catholic parochial schools. The manufactures include furniture, leather, flour, earthenware, lumber products, machinery, wagons, and shoes. It has a large wholesale trade in manufactures, lumber, fish, and agricultural products. The surrounding country is fertile, yielding cereals, grasses, and vegetables. It was settled in 1836 and incorporated as a city in 1853. Population, 1905, 24,026; in 1920, 30,995.

SHEEP, an important and useful class of ruminant animals, which are closely allied to the goat, but differ from it in having somewhat twisted horns with transverse ridges. The horns are hollow, and sometimes they are wanting in the females. They are destitute of a beard and the strong odor in the male goats.

Few animals possess greater value to man than do sheep, since their flesh is a nutritious food, the skin is useful for leather, parchment, and robes, the wool is of value in making staple clothing, and the milk is used for making butter and cheese in some countries. The flesh of the young is *lamb,* of the adult, *mutton.* The male sheep is called a *ram,* the female is designated a *ewe,* the young is termed a *lamb,* and a company is called a *flock.*

Shcep have been domesticated from remote antiquity, Abel being mentioned in Genesis as a keeper of flocks of sheep. It is impossible to ascertain whence the domestic stock came, since they were introduced into Western Europe before the historic period, but it is thought that their nativity is in the mountain regions of Asia. Wild sheep are essentially mountain animals, several species being still found in many sections of Central Asia and various parts of Africa, but animals of the wild stock are much smaller and have greatly inferior wools to the native and cultivated species. They are gregarious both in the wild and domesticated state. The ram is noted for its strong forehead, with which it is able to butt with considerable force against a foe.

Sheep culture was first introduced into America in 1609, and rapidly developed as an extensive industry, largely for the reason that sheep may be kept profitably on rough lands of little service except for pasturage, and because they are able to endure extremes of temperature. The ewe frequently brings forth twins, but usually only one at a birth, and the lambing season occurs generally in the early spring. About 90 per cent. of the sheep reared in the United States are Merinos, this grade being noted for its silky and fine wool. It was first introduced from Spain in 1801. Other grades of sheep include the Southdown, Shropshire, Cheviot, Delaine, Dorset horn, Leicester, Hampshire down, Lincoln, Cotswold, Rambouillet, Silesian, and Saxon. The *broad-tail sheep* of Asia is remarkable for its large tail, which often weighs from seventy to eighty pounds, and is considered a great delicacy for food It is protected by the shepherd, who attaches to it a small board on rough wheels to prevent it from being injured by dragging on the ground. The *Wallachian sheep* is noted for the size of its horns, and the *Iceland sheep* for having from three to five horns. Among the most valuable species are the *Astrachan* and *Circassian* sheep, which yield the famous Astrachan wool. The most extensive development of the sheep industry in the United States is in the arid regions of the West, but there are large interests in sheep rearing in New York, Ohio, Pennsylvania, and other central states. About 9,250,000 head are slaughtered annually in the United States. Ontario, New Brunswick, and Alberta have large interests in rearing sheep. The number of head in Canada is reported at 2,750,500. Australia, Central Asia, and various parts of Europe are among the principal sheep-growing regions of foreign countries. See **Wool.**

MERINO RAM.

BLACKFACED HIGHLAND RAM.

CHEVIOT EWE.

SHEEPSHEAD, a spiny-rayed food fish common to the Atlantic coast of North America. It is so named from the shape and color of its head, is highly esteemed for the table, and is caught by nets. The size is from twenty to thirty inches and the weight ranges from eight to ten pounds. The food of the sheepshead consists of shellfish and crustaceans, which it crushes with its teeth. Among the allied species are the butterfish, the moonfish, and the freshwater drum. The moonfish has a light gray color, a short and thick body, and a length of about twenty inches. It is caught chiefly in nets, since it is skilled in biting off the line with its sharp incisors.

SHEEPTICK, an insect belonging to the family of horse flies, often troublesome to sheep. It is wingless, has a flattened body and a long proboscis and broad head, and is parasitic on the body of sheep. The female attaches its eggs to the wool of the sheep, from which the young develop in a short time. They soon begin to extract blood by fixing the head in the skin of the sheep, often forming a large tumor. These pests are destroyed by dipping the sheep into various poisonous solutions. Sheep louse is another name for the same insect.

SHEFFIELD (shĕf'fēld), a city of England, in Yorkshire, at the confluence of the Don and Sheaf rivers, 145 miles northwest of London. It is important as a railroad junction, has regularly platted and well-improved streets, and occupies an imposing site. Sheffield has extensive canal connections; the Don River was made navigable as early as 1751. Among the

notable buildings is the Church of Saint Peter, dating from the reign of Henry I., Saint Mary's Church, Saint George's Museum, Wesley College, Firth College, Ranmoor College, and the Church of England Educational Institute. The city is beautified by many fine monuments, statues, and gardens. It has a large number of public schools, numerous hospitals and charitable institutions, and many institutes devoted to arts, sciences, and secondary learning. Among the manufactures are cotton textiles, woolen and silk goods, vehicles, buttons, hardware, cutlery, armor plate, railroad supplies, and engines. The most noted manufactured products are different forms of cutlery, these having existed in the city since 1620, when Cutler's Company was organized.

Sheffield was founded by the Saxons, but its site had been used as a Roman station for many years. Edward I. granted a charter in 1296. Chaucer mentions the town as an important center for the manufacture of cutlery. Mary, Queen of Scots, was imprisoned for fourteen years in the castle maintained in the time of Queen Elizabeth, when the castle was known as the Sheffield Manor house. However, its importance as a trade and manufacturing center dates only from the early part of the last century, being greatly augmented by the building of railroads and other improvements. It was chartered as a city in 1893. Five members represent it in Parliament. Population, 1921, 454,653.

SHEIK (shēk), meaning the *eldest*, the title of the chief of an Arab tribe and of various dignitaries among the Mohammedans. It has special reference to the heads of monasteries and to the higher order of religious preachers, as the mufti of Constantinople, who is sometimes called *Sheik ul-Ismal*, which signifies chief of the true believers. Many sheiks claim a long line of ancestors, including the sheik of Mecca, who receives presents from caravans in consideration of his supposed descent from Mohammed.

SHEKEL (shĕk"l), the Hebrew unit of weight and of money. It was probably equal to about half an ounce avoirdupois, or about 218 grains. The value of the silver shekel is usually stated to have been from 50 to 60 cents, while the golden shekel was of half this weight and had a value of $4.55. Both as money and as a weight the shekel was divided into the *beha*, *reba*, and *gerah*, valued respectively one-half, one-fourth, and one-twentieth of a shekel.

SHELBY, Isaac, pioneer and soldier, born in North Mountain, Md., December 11, 1750; died July 18, 1826. His father engaged in the cattle business in Tennessee, where his family removed soon after, and Isaac engaged in the border Indian war. He entered the colonial army at the beginning of the Revolution, and distinguished himself at the Battle of Long Island Flats, Tennessee, with the Indians in 1776. Subsequently he assisted in capturing the British stores at Chickamauga, took part in the Battle of King's Mountain, and served as Governor of Kentucky from 1792 to 1796, and again from 1812 to 1816. In the War of 1812 he organized a body of 4,000 volunteers and joined General Harrison in Canada, taking part in the victory of the Thames. Congress voted him a gold medal for this service.

SHELBYVILLE (shĕl'bĭ-vĭl), a city in Indiana, county seat of Shelby County, on the Big Blue River, 25 miles southeast of Indianapolis It is on several surfaced highways and on the Pennsylvania, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads, and is surrounded by a fertile farming and dairying country. The notable buildings include the county courthouse, the public library, the city hall, the high school, and many churches. Forest Hill Cemetery is a fine burial ground. Among the manufactures are flour, fireless cookers, tobacco, bread, bags, brick, machinery, and furniture. Natural gas is obtained in its vicinity. It has a large trade in farm produce and merchandise. Population, 1900, 7,169; in 1920, 9,701.

SHELDON (shĕl'dŭn), **Charles Monroe,** author and clergyman, born in Wellsville, N. Y., February 26, 1857. His early life was spent on a farm in Dakota, and he afterward studied at Brown University and Andover Theological Seminary. He went to London in 1886 to study the conditions of the poorer classes, and two years later became pastor of the Central Congregational Church at Topeka, Kan. His books have had a very large sale, especially the one entitled "In His Steps," which was written from the view of the question, "What would Jesus do?" It has been translated into German, Spanish, French, Swedish, Norwegian, Russian, Italian, Armenian, and many other languages. Other publications include "Richard Brice," "Twentieth Door," "King's Question Book," "Crucifixion of Philip Strong," "His Brother's Keeper," "Malcolm Kirk," "Redemption of Freetown," "For Christ and the Church," "The Heart of the World," and "Two Old Friends."

SHELDON, Edward Austin, educator, born at Perry Center, N. Y., Oct. 4, 1823; died in 1897. He studied at Hamilton College, and in 1851 became superintendent of schools at Syracuse and subsequently at Oswego. In 1862 he was made principal of the Oswego State Normal and Training School. He exercised a wide influence upon educational work in the United States by introducing the methods of teaching known as *object lessons*. His publications include "Lessons on Objects" and "Manual of Elementary Instruction."

SHELDRAKE (shĕl'drāk), the common name of a class of ducks usually regarded a connecting link between geese and ducks. They are native to the Eastern Hemisphere. The head and neck are dark glossy-green with a white collar beneath, and under this is a chestnut

color that extends over the upper part of the back. The rest of the plumage is white with black and greenish markings. They frequent sandy coasts, breeding in a burrow, often that of the rabbit. They lay about twelve or fourteen eggs, which are nutritious food. The sexes are quite alike in plumage, but the male is somewhat the larger. These ducks, though quite shy, are capable of being domesticated. Large numbers are hunted for their eggs and down in the Black, Caspian, Mediterranean, and other seas. Besides the *common sheldrake,* there are the *ruddy sheldrake* of Barbary and the *chestnut sheldrake* of Australia. An allied species common to the United States is sometimes called sheldrake, but it is more properly a *red merganser.*

SHELDRAKE.

SHELL, the hard covering of many invertebrate animals. It serves to encase the soft and vulnerable bodies of certain invertebrates, but the term is also applied to the covering of some part of it and to the outer envelope of an egg. Many classes of shells occur in the animal kingdom, varying in size from minute microscopic organisms to large formations weighing 500 pounds. All shells possess a more or less distinct organic structure, which in some animals resembles true skin, while in others it is quite like the epidermis of the higher animals. The shells of many groups of mollusks differ so materially that it is often possible to determine the family, and in some cases even the species, by examining small fragments of their shells, this being true both in fossil and recent specimens. Their composition consists usually of calcium carbonate and albumen, and the shell formation gradually thickens by the addition of successive layers as the animal grows from infancy to maturity.

Shells are known as porcelain or pearly, according to their constituency. Those having more lime than albumen form the hard *porcelain shells,* while those having consecutive layers of albumen and lime constitute *pearly shells,* so called from their resemblance to mother-of-pearl. The two classes as to form include the univalve and bivalve shells. *Univalves* are those which have only one part, such as the shells of snails; *bivalves* are formed of two parts joined together by a hinge, like those of the clam and oyster. Many forms are included in both classes, but bivalves are largely pearly shells and univalves are mostly porcelain. Shells are useful for many purposes, among them for ornaments, buttons, and handles for edged tools. In some countries they are burned into lime and used for fertilizing land.

SHELL, a hollow metallic projectile filled with an explosive, which is fired either by a time fuse or by percussion. Shells were first invented in 1480, when they were made largely of cast iron and fired as bombs from mortars, and as such were successfully employed by the Turks at the siege of Rhodes in 1522. They came into general use by the middle of the 17th century, but since then many new and useful improvements have been made. Those of cast iron, intended for mortars and smoothbore cannon, are spherical in form, but elongated and cylindrical shells are generally used in rifled guns. When fired from a rifled gun, they take a rotary motion from the grooves, thus insuring truer carriage. The *common shell* is a hollow projectile charged with powder and used to destroy masonry and earthworks, but *Shrapnel shells,* so named for the inventor, contain bullets and fragments of iron in addition to a charge, and when set on fire release the contents with great destruction. Various modifications of these two classes are made, such as *segment shells,* containing iron segments and powder, and *carcases,* containing material designed to set on fire the buildings or objects against which they are thrown.

SHELLEY (shĕl'lĭ), **Percy Bysshe,** noted poet, born in Sussex, England, Aug. 4, 1792; died July 8, 1822. He was the eldest son of Sir Thomas Shelley, a man of wealthy and ancient parentage, and studied at Eton and Oxford University. His first work as an author was undertaken at Eton, where he joined a fellow student in writing two romances, but soon left that institution because he fancied the government savored of tyranny. At Oxford he experienced like unpleasantness, and as a consequence filled his mind with atheistic arguments. In 1811 he published a tract entitled "Necessity of Atheism," for which he was expelled from the university, and shortly after married Harriet Westbrook, a girl of inferior rank, which caused his family to renounce him. This union proved unhappy. His wife with two children returned to her father's house, in 1814, and two years later ended her sad life by drowning. He had previous to this made an extended tour through France, Germany, and Switzerland in company with Mary Godwin and a relative, Miss Clairmont, and shortly after the death of his wife married the former. The delicate state of his health rendered it necessary that he should leave England for a warmer climate, and the remainder of his

PERCY B. SHELLEY.

life was spent abroad, with only one short interruption.

While in Switzerland Shelley formed the acquaintance of Byron, upon whom he exerted a powerful influence, and ever after kept up an intimate acquaintance with him. Shortly after he settled at Rome, where many of his finest productions were composed. Boating had always been a passion with him, and it was especially convenient to take trips to Naples, Florence, Pisa, and other points of interest. His friends included, besides Byron, Leigh Hunt, Trelawny, and a number of other eminent writers. His death resulted while returning with a friend from Leghorn in a small yacht, which was caught in a wind and stranded in the Gulf of Spezia, and both were drowned. His body was washed ashore and, according to the quarantine laws of Tuscany, was burned. The ashes were deposited in the Protestant cemetery at Rome by Byron.

Shelley was gifted with genius of a high order, possessed richness and fertility of imagination, and was energetic in the reproduction of his conceptions. No English poet has surpassed him in the command of all the resources of metrical harmony. His early literary life was somewhat clouded by financial straits, but the death of his grandfather gave him a fixed income and a fine estate near Windsor Forest. His numerous writings include "Queen Mab," "Alastor, or the Spirit of Solitude," "Revolt of Islam," "Witch of Atlas," "Prometheus Bound," "Rosalind and Helen," "Sensitive Plant," "Ode to a Lark," "The Skylark," "The Cenci," and "Hellas."

SHELL-LAC (shĕl'lăk). See **Lac.**

SHENANDOAH (shĕn-ạn-dō'ȧ), a borough of Pennsylvania, in Schuylkill County, 138 miles northwest of Philadelphia. It is on the Lehigh, the Pennsylvania, and the Philadelphia and Reading railroads. The anthracite coal region in the vicinity produces annually about 1,500,000 tons. The notable buildings include the public library, the high school, the townhall, the Greek Catholic church, and many fine churches. Among the manufactures are machinery, utensils, shirts, meat, bread, hats and caps, hardware, and vehicles. It has sanitary sewerage, public waterworks, and electric street railways. The place was platted in 1862 and incorporated in 1866. Population, 1900, 20,321; in 1920, 24,726.

SHENANDOAH, a river of Virginia, which rises by two branches in Augusta County and flows toward the northeast, joining the Potomac at Harper's Ferry. The Shenandoah valley lies between the Blue Ridge and the Alleghenies, and is one of the richest sections of the State. The river has a total length of 170 miles and is navigable for a hundred miles from its mouth. Many notable events occurred in the valley of the Shenandoah during the Civil War. General Sherman devastated it in 1864.

SHEOL (shē'ōl), a word used frequently in the Old Testament and by some writers, being equivalent to the word *hell,* or the *Hades* in classical Greek literature. The words *pit, grave,* and *hell* take its place in the Revised Version of the Bible, but the last term is used only once. Sheol signifies a cave or tomb for the departed spirits. See **Hades.**

SHEPHERD DOG, a breed of dogs, usually classed with the wolf species. The size is medium, the tail is long and bushy, and the muzzle is quite sharp. Dogs of this breed are noted for their bright eyes and high grade of intelligence. They may be trained to watch and drive flocks and herds without being accompanied by the master. Dogs of this class are used extensively to attend sheep in mountainous countries, and are popular as farm dogs to drive cattle. The *Scotch collie* is a celebrated species of this breed.

SHEPHERD'S PURSE, a widely distributed weed of the Temperate zones, where it prevails in abundance along roadsides and in fields and pastures. The plant is an annual, has simple leaves and small white flowers, and bears its seed in a pod resembling a purse, hence its name.

SHERBROOKE (shĕr'brŏŏk), a city in Quebec, capital of Sherbrooke County, eighty miles east of Montreal, at the confluence of the Magog and Saint Francis rivers. It is on the Canadian Pacific, the Canadian National, the Quebec Central, and the Boston and Maine railways. The principal buildings include the county courthouse, the public library, the post office, General Hospital, Bishop's College, and St. Charles College. It has manufactures of woolen goods, flour, cigars, hardware, clothing, and lumber products. In the vicinity are iron, asbestos, copper, and chrome deposits. It has a large trade in lumber, paper pulp, asbestos, minerals, and merchandise. A large proportion of the inhabitants are French-Canadians. Population, 1921, 23,515.

SHERE ALI, Ameer of Afghanistan, born in 1825; died Feb. 21, 1879. He succeeded his father, Dost Mohammed, as Ameer in 1863. Several rivals contended for the throne, owing to his apparent willingness to adopt European customs, but he became fully established as supreme ruler in 1869. He agreed to the establishment of the Russian embassy in Kabul, but refused to permit the same privilege to the British, hence the latter invaded the country in 1878. Shere Ali left Afghanistan to take refuge in Turkestan, where he died.

SHERIDAN (shĕr'ĭ-dạn), a city of Wyoming, county seat of Sheridan County, 175 miles northwest of Newcastle, on the Chicago, Burlington and Quincy Railway. It is surrounded by a fertile farming and coal-mining region and has a large trade in merchandise and live stock. The principal buildings include those of the county, the high school, and a college. It has manufactures of brick, clothing and farm machinery. Population, 1925, 8,436.

SHERIDAN, Philip Henry, eminent military leader, born in Albany, N. Y., March 6, 1831; died at Nonquitt, Mass., Aug. 5, 1888.

PHILIP H. SHERIDAN.

His parents came from Ireland and settled in Albany a short time before his birth, but soon after removed to Ohio, where he attended the public schools. He graduated from the West Point Military Academy in 1853. Subsequently he did military duty in various portions of the country, and entered the Union army in 1861 with the rank of captain. After serving as quartermaster of the army of southwestern Missouri and chief quartermaster of Halleck's army in Mississippi, he was promoted colonel of the Second Michigan cavalry in 1862. He defeated a superior cavalry force at Booneville, and soon after was made general of volunteers. In the same year he displayed remarkable ability in rallying the Union forces at Perryville. On Jan. 2 and 3, 1863, he commanded the left division of the right wing of the Union army at Stone River, his efficient services in outflanking General Bragg being rewarded by promotion to the rank of major general. He next fought at Chickamauga and Missionary Ridge. At the latter engagement he attracted the attention of General Grant by his combination of dash and judgment, and the latter soon after gave him command of the cavalry of the army of the Potomac. In that capacity he distinguished himself in the Battle of the Wilderness on May 5-6, 1864, gaining by his continued success an appointment to the command of the army of the Shenandoah. Later he was assigned the task of clearing the northwestern part of Virginia, from which the Confederate forces continually threatened Washington. General Early had command of the Confederate forces at Winchester, where he was defeated by Sheridan in September, and shortly after at Fisher's Hill, the latter taking about 5,000 prisoners in the two battles.

On Oct. 19, 1864, the Confederates surprised and routed Sheridan's army at Cedar Creek. At that time Sheridan was on his way back from Washington and, hearing the noise of battle twenty miles away, at Winchester, he rode hastily to the contest and turned defeat into victory by waving his hat and shouting: "Face the other way, boys; we are going back." He was soon after made major general in the regular army, and Congress voted him the thanks of the nation. In 1865 he joined General Grant and subsequently accompanied the army of the Potomac until the close of the war, assisting in the operations before Petersburg and the final surrender of General Lee at Appomattox. He commanded the department of the gulf from 1866 to 1867 and of the Missouri from 1867 to 1868, was made lieutenant general in 1869, and became general in 1888. In 1870 he witnessed the leading battles and maneuvers of the Franco-German War. He was modest, and could be relied upon to manage efficiently important commands, while his boldness, dash, foresight, and judgment were alike admirable. Grant compared him with Napoleon and Frederick the Great, and Archibald Forbes regarded his magnetism and genius for war equal to that of Skobeleff. He wrote his "Personal Memoirs," which appeared in two volumes after his death. James E. Kelly made a fine statuette of him, known as "Sheridan's Ride," and he has been otherwise fittingly honored.

SHERIDAN, Richard Brinsley Butler, orator and dramatist, born in Dublin, Ireland, Sept. 30, 1751; died July 7, 1816. He was a son of Thomas Sheridan (1721-1788), an efficient actor and later teacher of elocution, and received his early education in a school of his native town. In 1763 he was sent to study at Harrow, where he joined a schoolmate in writing a farce entitled "Jupiter." In 1773 he married Miss Linley, an accomplished musician of Bath, and shortly after settled in London to engage in literary work. He soon became part proprietor of the Drury Lane Theater, where his "The Rivals" and the "School for Scandal" attracted wide attention. In 1780 he entered Parliament for Stafford.

Sheridan became Undersecretary for Foreign Affairs in 1782, and the following year Secretary of the Treasury. His speeches in Parliament are regarded among the finest delivered in that body, being noted for their oratorical style and persuasive reasoning. The most noted were the three great orations delivered while the proposal to impeach Warren Hastings was pending. In 1794 he made a remarkable address on the "French Revolution," which has been widely read. His parliamentary career ended in 1812, after serving in that body 32 years, but when retiring from public service his property had been spent and he had lost his former friends. At least a part of his financial difficulties was due to extravagant living. He suffered a considerable loss when Drury Lane Theater burned in 1809, and at one time was imprisoned for debt. He was buried in Westminster Abbey.

SHERIFF (shĕr'if), the chief administrative officer of a county, both in Great Britain and the United States. The duties relate to the execution of civil and criminal processes. They include the maintenance of peace and order and the attendance upon courts as administrative officer. In most cases the sheriff is elected by direct vote of the people, but in some instances

this officer is appointed. He is required to give a bond for the faithful performance of his duties. In the more populous counties he has one or more deputies, for whose official acts he is civilly liable. The sheriff originally exercised judicial authority in England and Scotland, where he presided over the common-law county court, and twice a year he made a circuit to the subdivisions of his shire, known as the *sheriff's tour.*

SHERMAN (shĕr'măn), a city in Texas, county seat of Grayson County, 65 miles north of Dallas and 12 miles south of the Red River. Communication is furnished by the Missouri, Kansas and Texas, the Texas and Pacific, the Atchison, Topeka and Santa Fé, and other railroads. It is surrounded by a rich cotton, grain, and live-stock country. The manufactures include flour, cotton-seed oil, cordage, furniture, tobacco products, vehicles, ice, brooms, machinery, and farming implements. It has electric lights and street railways, public waterworks, pavements, and numerous schools and churches. Sherman is the seat of Austin College, Kidd-Key College, Carr-Burdette College, Saint Joseph's Academy, and several other institutions of learning. It has a fine courthouse, built of brick and stone. The place was settled in 1848 and incorporated in 1895. Population, 1900, 10,243; in 1920, 15,031.

SHERMAN, James Schoolcraft, statesman, born at Utica, N. Y., Oct. 24, 1855. He studied at Hamilton College, where he graduated in 1878, and two years later was admitted to the bar. After being mayor of Utica, he was elected to Congress, in 1886, in which he served continuously until 1909, except for the period from 1891 until 1893. He was elected Vice President of the United States in 1908, on the Republican ticket with William H. Taft. During the campaign the New York *World* charged him with having promoted a company to control certain public lands in New Mexico, the design being to acquire them at about one-tenth of their value, but it was shown that the project was abandoned because the land could not be secured without violating the law. He died Oct. 30, 1912.

SHERMAN, John, statesman, born in Lancaster, Ohio, May 10, 1823; died Oct. 22, 1900. His father died in 1829, leaving a large family, and he was soon after adopted by a relative who resided at Mount Vernon. A sister provided the means for his education in a school at Lancaster, and he afterward studied law at Mansfield in the office of his brother, C. T. Sherman. In 1844 he obtained admission to the bar, and entered upon a successful practice in Mansfield, where he married a daughter of James Stewart in 1848. In 1854 he was elected to Congress as a candidate of the Free-Soil party, and he was reëlected two succeeding terms. He served on a number of important committees, and attained recognition as one of the foremost members in the lower house.

Sherman was again elected to Congress in 1860, but was chosen to the United States Senate in 1861, serving continuously in that body until in March, 1877, when he was appointed Secretary of the Treasury by President Hayes, a position he held until the close of that administration, in 1881. In the latter year he was again elected to the Senate, and was reëlected in 1887 and in 1893. President McKinley appointed him Secretary of State in 1897, a position he held until in April, 1898, when he retired from public life, and was succeeded by William R. Day, in the Cabinet. The name of John Sherman is inseparably connected with the history of American finance and politics. Besides being prominent as a speaker on the floor of Congress and in committees, he exercised a wide influence on the policy of the government. One of the most noted financial measures enacted while he was Secretary of the Treasury is the resumption of specie payments in 1879. He wrote "Recollections of Forty Years in the House, Senate, and Cabinet," and published "Selected Speeches and Reports on Finance and Taxation, 1859-1878."

SHERMAN, Roger, statesman and signer of the Declaration of Independence, born in Newton, Mass., April 19, 1721; died in New Haven, Conn., July 23, 1793. He learned the trade of a shoemaker while a boy and followed it as a business until 1743, when he entered a store at New Milford, Conn., and was chosen county surveyor in 1745. After studying law, he was admitted to the bar in 1754, and became a member of the Legislature and later a judge of common pleas. In 1774 he was selected a member of the Continental Congress, where he served on the committee to draft a declaration of independence, and subsequently aided in framing the Articles of Confederation and the Federal Constitution. He was elected to the Senate in 1791, but died two years later. Other positions of importance held by him include membership in the Connecticut Legislature for nineteen years, treasurer of Yale University from 1766 to 1776, and mayor of New Haven from 1784 to 1793.

SHERMAN, William Tecumseh, distinguished general, born in Lancaster, Ohio, Feb. 8, 1820; died in New York City, Feb. 14, 1891. He was a brother of John Sherman, and on the death of his father, in 1829, was adopted by Thomas Ewing, who provided for his education in the Lancaster Academy and afterward procured his appointment as cadet at the West Point Military Academy. In 1840 he graduated the sixth in rank of his class and secured an appointment to the artillery. He served against the Seminoles in Florida from 1840 to 1842, was stationed at Fort Moultrie, South Carolina, until 1846, and subsequently served as adjutant general during the Mexican war. He married Ellen Boyle Ewing, daughter of Thomas Ewing, in 1850, and three years later

resigned his commission in the army to become manager of a bank in San Francisco. Sherman, having begun the study of law in 1843, was ultimately admitted to the bar. In 1858 he began the practice of law in Leavenworth, Kan., but was made superintendent of the military academy at Alexandria, La., the following year. When that State seceded from the Union, he promptly resigned, and was appointed colonel in the United States army with a command under General McDowell.

WILLIAM T. SHERMAN.

Sherman had command of a brigade in the First Battle of Bull Run. He was made brigadier general soon after and was assigned to the department of the Cumberland, of which he was given command on Oct. 8, 1861. Sherman was among the first to represent to the Secretary of War that it was necessary to secure 60,000 men for the defense of Kentucky and 200,000 to conduct successful operations against the enemy, but many held the view that the war would be of short duration, and characterized his judgment as unsound. General Buell superseded him in November, and he was ordered to report to General Halleck, under whom he received command of a camp of instruction near Saint Louis. Later he formed a division for himself, and in the Battle of Shiloh, on April 6, 1862, won favorable mention by Grant and Halleck for distinguished services. He was made major general of volunteers soon after, and exercised a large influence in the operations under Grant around Vicksburg and Memphis. The first attack on Vicksburg was made in December, 1862, but Grant's supplies were captured at Holly Springs, thus giving the enemy time to reinforce the city, and Sherman found it impossible to successfully assail that stronghold with the inadequate force at his disposal. However, he was joined by General McClernand in storming Arkansas Post, where they captured 7,000 prisoners, and in 1863 he bore the brunt of the battle at Chattanooga.

When Grant became commander in chief of the forces in March, 1864, Sherman was put in command of the military division of the Mississippi and was ordered to advance upon Atlanta against Gen. Joseph E. Johnston. That stronghold was occupied on Sept. 1, but involved a month and a half of fighting, including the battles of Dalton, Resaca, New Hope Church, and Kenesaw Mountain. Soon after he started upon his famous march to the sea with 70,000 men, and, after defeating the enemy at Fort McAllister on Dec. 21, entered Savannah. A month later he started on his march northward through the Carolinas to support General Grant, but, on hearing the news of the surrender of General Lee, General Johnston sent to Sherman for terms of peace, and surrendered at Durham's Station, N. C., on April 26, 1865. Sherman was given command of the division of the Mississippi after the war. He was made lieutenant general in 1866, and President Grant, in 1869, raised him to the rank of general, with headquarters in Washington. He made a tour of Europe from 1871 to 1872, and was placed on the retired list on Feb. 8, 1884. Though given numerous opportunities to fill political offices, he constantly refused. He ranks among the most eminent military leaders of America, being characterized by promptness in execution and fearlessness in confronting danger, yet strengthened by remarkable soundness of judgment. His influence over the soldiers was always for the common good, and his popularity among those subordinate to him was conceded from the first. He wrote "Personal Memoirs."

SHERRY (shĕr'rȳ). See **Wine.**

SHERWOOD (shĕr'wo͝od), **William Hall,** musician, born in Lyons, N. Y., Jan. 31, 1854; died Jan. 7, 1911. He studied at Lyons Academy, which was founded by his father, and subsequently received musical training in Berlin and Weimar, Germany. While in the latter city he was instructed by Liszt. On returning to America, he became a teacher in the New England Conservatory, and in 1889 removed to Chicago, where he founded the Sherwood Piano School. He played successfully in the principal cities of Europe, Canada, and the United States, and is the only American ever invited to take part with the leading orchestras of Germany. His compositions consist chiefly of high-grade music for the piano. He published "Music Study and Interpretative Technique."

SHERWOOD FOREST, a hilly region of England, in Nottinghamshire. Formerly fine forests covered the region, which is about twenty-five miles long and seven miles wide, but it is now largely cleared and occupied by farms, gardens, and pastures. Sherwood Forest is the region where Robin Hood and his followers enacted many marauding exploits.

SHETLAND (shĕt'lạnd), an island group north of Scotland, situated about fifty miles northeast of the Orkney Islands, forming a county of Scotland. About 100 islands are included in the group. All are more or less rocky, with precipitous shores in many places. They have an area of 325 square miles. The three chief islands are Mainland, Yell, and Unst, but 26 others are inhabited. Dry and extreme cold characterize the winter, when the days are only a few hours long, but the summers are warm and moist. The total population of the group is 28,695. Lerwick is the principal town and seaport. It has the public offices, law courts, a customhouse, and a population of 4,154.

Native timber is not found in the islands, but forestry is promoted. Fishing is the principal industry. Considerable interests are vested in rearing cattle, horses, sheep, and poultry. The soil products include oats, turnips, hay, potatoes, and garden vegetables. Among the chief exports are salted fish, sheep, eggs, and cattle. The islands are particularly famous for the rearing of Shetland ponies. Deposits of iron, copper, sulphur, and sandstone abound. The manufactures include woolen goods, fishing supplies, fish oil, cured fish, and utensils. These islands were known to the Romans as the Ultima Thule, and long formed a possession of Scandinavia. The people still speak a dialect largely mixed with Norse words. They are a sober, intelligent, and industrious class.

SHIBBOLETH (shĭb'bŏ-lĕth), a test word mentioned in Judges xii., 6. It was used as a criterion by Jephthah and the Gileadites to test the Ephraimites after their victory over the latter. The Ephraimites were easily known by omitting the sound of *sh,* and pronouncing the word *sibboleth* instead. It is still used in several modern tongues to test the speech and manners of certain social classes.

SHIELDS (shēldz), **South,** a city in England, at the mouth of the Tyne River, eight miles northeast of Newcastle-on-the-Tyne. Opposite the city are North Shields and Tynemouth, with which it is connected by steam ferry. It has railroad and steamboat facilities, and an extensive trade in coal, earthenware, and food stuffs. Among the noteworthy buildings are the townhall, the public library, the marine school, and the public museum. The manufactures include cordage, sailing vessels, anchors, earthenware, chemicals, glass, steamboilers, and machinery. The harbor is protected by an extensive breakwater and has large docks for repairing ships. A military post was established on its site by the Romans, but its prosperity dates from the development of its salt works in 1489, and its modern enterprise from the building of railroads in the middle of the last century. Population, 1922, 108,649.

SHIITES (shē'īts), a denomination of the Mohammedan religion, constituting the most numerous branch in Islam. They reject the *Sunna,* the law held by the Sunnites, and are followers of Ali, the son-in-law of Mohammed, whom they look upon as the first lawful successor of the Prophet. Persia is the only nation in which the Shiites predominate, but they are quite numerous in India, the southern part of Arabia, and among the Tartars. In practice they are superstitious, and their ministers are of the dervish type. They are inclined to separate religion from ethics, and are less orthodox than the Sunnites, but the two sects stand together as Moslems against the Unbelievers.

SHILLABER, Benjamin Penhallow, humorist, born in Portsmouth, N. H., July 12, 1814; died Nov. 25, 1890. He began his career as a printer at Dover, N. H., and in 1835 removed to Demerara, Guiana, where he worked as a compositor in a printing office. In 1840 he became connected with the Boston *Post,* in which he published many sketches under the title "Sayings of Mrs. Partington." He became one of the editors of the Boston *Saturday Evening Gazette* in 1856, and after ten years removed to Chelsea, Mass., where he devoted himself to literary work. His books include "Rhymes with Reason and Without," "Ike and His Friends," "Life and Sayings of Mrs. Partington," and "Partingtonian Patchwork."

SHILLING, a British silver coin, equivalent to 24.3 cents in the money of Canada and the United States. The shilling consists of 12 pence, or one-twentieth of a pound sterling. The shilling was equal to a certain number of pennies prior to the time of Henry VII., but the number was fixed at twelve as early as the time of the Conqueror. In the colonial times of America the value varied greatly. At present the term shilling is applied locally in the United States to 12½ cents, two being equal to 25 cents, popularly called *two bits* in some sections.

SHILOH (shī'lō), an ancient town of Palestine, in the region occupied by the tribe of Ephraim. It was the sanctuary of the ark in the priesthood of Eli and Samuel, when it formed a religious center of influence. The Philistines destroyed it after the disastrous Battle of Ebenezer. Its site is thought to be occupied by the modern village of Seilun.

SHILOH, Battle of, an important engagement of the Civil War, so named from a church about two miles west of Pittsburg Landing, on the Tennessee River. The Union army of 40,000 men was commanded by General Grant and the Confederate of 45,000, by Generals Johnston and Beauregard. General Grant reached Pittsburg Landing with his army, and on April 6 was attacked by the Confederates, the latter driving divisions of the Union army under Generals Sherman and McClernand back with great loss, but in the afternoon General Johnston was killed and the Confederates retreated. General Buell joined Grant with 7,000 men the next morning, when the Union army assumed the offensive, and in the afternoon began to rout the Confederates and force them to make a final retreat. The Federals lost about 13,500 and the Confederates about 14,000. This engagement is also called the Battle of Pittsburg Landing.

SHINTOISM (shĭn'tō-ĭzm), one of the chief religions of Japan, formerly the universal religion of that country. In 552 A. D. Buddhism was introduced from Corea, and the two now form the religions of the Japanese. Shintoism is primarily concerned with the worship of nature, but since its first introduction it has partaken largely of a form of hero and ancestor worship. The Mikado is regarded the direct descendant and representative of the sun god-

dess Amaterasu. Worship implies implicit obedience to him.

SHIP, the name applied in a restricted sense to a large vessel with bowsprit and three masts, each of which carries square sails, but in an extended sense to vessels adapted for navigation, including all kinds except boats. The restricted application of the term was formerly observed with marked care, but its use has been modified by the increase of size in sailing vessels and the

SHIP.

enlarged use of steam power as a propelling agency. Ships are now applied to many uses and the construction and name vary according to the purpose they are to serve; thus, have arisen such terms as transports, barks, luggers, schooners, sloops, brigs, galleys, xebecs, merchantmen, man-of-war ships, and many others.

The *bowsprit* is a spar projecting forward and usually slightly upward from the bow of the vessel, resting upon the stem and apron, and supporting the boom. The *masts* are named in consecutive order from the fore, including the foremast, the mainmast, and the mizzenmast; and the fourth, if present, is called the jiggermast. Each mast is made up of a lower mast, a top mast, and a gallant mast, and the main sails carried on each of the masts are named according to the particular one to which they belong. The *brig* has two masts with square sails and is smaller than a *ship,* while the *schooner* has two or three masts, and the *sloop* has only one. A *cutter* is formed quite like a schooner, and a *barkentine* combines the features of a schooner and a ship proper. The different parts of a ship include the *sails,* made of stout fabric and designed to propel the vessel; the *rigging, ropes,* and *chains;* the *spars,* including the timber above the hull; and the *hull,* the part that glides in the water. There are three general divisions of the hull: the *bow,* or forward part; the *waist,* or middle part, and the *stern,* or after part. The raised sides are *bulwarks,* and the part open to the sky is the *upper deck.*

SHIPBUILDING. *Ancient.* It is probable that the construction of vessels to move on water was first suggested by floating logs in rivers and lakes. Later rafts were made by fixing planks and spars together to form a floating surface, thus constituting a strong, buoyant support for a cargo, and later large tree trunks were hollowed out and sharpened at the ends to form primitive canoes. It is known that two modes of propulsion, those by oars and sails, are practically as old as the early stages of constructing sailing vessels. The Mediterranean Sea is the noted scene of much activity by ancient nations in the construction and use of vessels of different kinds, and in shipbuilding these nations made use of both means of propulsion, as in the galleys and triremes. However, as barbarism overthrew the ancient civilizations, it materially retarded shipbuilding. Consequently it became necessary for the people of medieval times to draw largely upon their own resources in planning and building ships. After the decline of Rome no people possessed stronger galleys and more fearless sailors than did the Norsemen, who cruised along the Atlantic coasts of Europe and Africa and penetrated all parts of the Mediterranean.

The discovery of the compass did much to introduce better methods of navigation. This circumstance and the establishment of sailing routes to India and America were epoch-making events in the construction and use of vessels fitted to brave the high seas in regions far from land. Spain was long the foremost naval power and marine nation, but it met an active competitor in Holland in the 16th century. France, Denmark, and England in the meantime made rapid strides toward building powerful navies. Shipbuilding was one of the foremost branches of the manufacturing industry in the colonial period of America, especially in the New England states. The first American ship was built in 1607 near the mouth of the Kennebec River and was called the *Virginia,* and in 1698 a law was enacted that all vessels of more than thirty tons should be built under the supervision of a shipwright. American ships began to enter into active competition with those of Europe in the early part of the 18th century, American manufacture being facilitated by the cheapness of large and valuable timber. Consequently sailing vessels long formed a chief product of manufacture for export.

Modern. Shipbuilding was modified remarkably after the introduction of steam as a propelling force. The first vessel to apply steam as the motive power was built by Robert Fulton in 1807 and was named the *Clermont,* which plied successfully on the Hudson River. In 1811 was completed the first steam vessel of European construction, the *Comet.* It was the earliest steam vessel to be constructed on a plan fitted for service on the sea. Captain Ericsson, in 1837, completed a small steam vessel driven by a screw, with which he sailed successfully off the coast of England, by which an epoch was marked in shipbuilding. The *Great Western*

was the first vessel to commence regular Atlantic passage under steam, in 1838, but its propelling power was by paddles. Soon after wood began to give way to iron as a material in construction and then to steel, and the screw began to be generally adopted in 1845, its importance being recognized by efficient service in several ships of war. It has been found that an iron vessel is lighter than one of the same size built of wood. Besides, iron is much more durable, has greater strength, and can be bent into the required shape.

All the largest vessels are now propelled by steam, and, in fact, sail ships are practically discarded from the important freight and passenger service. The reason is to be found in the circumstance that a steam-propelled vessel can make material progress in spite of unfavorable wind, and its capacity for rapid sailing is greatly in excess under all circumstances. The largest steam-propelled vessels are very large, having a capacity up to 52,500 tons, with machinery of from 25,000 to 80,000 horse power, and in many cases four masts are added to further facilitate progress in sailing. An immense vessel called the *Vaterland* was built in Germany in 1914, having a length of 950 feet. It was acquired by the United States during the World War and renamed the *Leviathan.*

In modern shipbuilding attention is directed particularly to the safety of vessels, which depends upon strength, stability, water-tightness, and floatability in case of injury. The employment of steel and iron in construction has revolutionized naval architecture, and by the use of these materials it is possible to devise framing and plating to insure great strength. Water-tightness depends upon calking the seams between plates or planks, for which purpose oakum is driven into the slight spaces until it is hard, and the calking is made secure by laying the planks with a slight bevel outward and covering it with hot pitch or marine glue. In modern construction floatability, when vessels are injured, is dependent upon compartments made water-tight, which are secured by bulkheads constructed to extend at intervals across the ship. In most merchant vessels there is but one compartment, while warships are provided with a number, some running across the vessel and others being longitudinal.

The first armored battleships built in the United States were the *Maine* and *Texas,* begun in 1889, and in 1891 work was commenced on the *Massachusetts, Oregon* and *Indiana,* which carried four six-inch, four eight-inch, and four thirteen-inch guns and were considered among the most powerful vessels at the time of their completion. Work on the *Iowa,* an armored vessel of 11,340 tons, was commenced in 1893, and soon after the *Kentucky* and *Kearsarge,* each 11,525 tons, were ordered. The *Alabama, Wisconsin* and *Illinois* have the same capacity, while the *Missouri* and *Ohio,* completed in 1903, have a capacity of 12,500 tons. In 1901 the *Georgia, Virginia, Nebraska, New Jersey,* and *Rhode Island,* each 15,000 tons, were commenced, and in 1902 work was begun on the *Louisiana* and *Connecticut,* capacity 16,000 tons. The *Tennessee* and *Wisconsin,* commenced in 1902, are 502 feet long and have a displacement of 14,500 tons. These vessels, besides automatic and machine guns, carry 22 three-inch, 16 six-inch, and four ten-inch guns. The *North Carolina, Montana* and *South Dakota,* each with a displacement of 43,200 tons were built in 1920.

In the construction of iron and steel vessels the United States holds second rank, being exceeded only by Great Britain. Below is shown a comparison of the tonnage of iron and steel vessels constructed in the two years named:

COUNTRY.	1902.	1922.
Great Britain	1,581,406	1,031,081
United States	270 932	119,138
Germany	252,719	575,262
France	55,345	184,509
Norway and Sweden	27 572	194.445
Holland	12,542	163,132
Italy	9,679	101,177

Modern naval architecture is a matter of novelty when compared to pioneer shipbuilding. From primitive construction to the present is a long space of time and an equally great difference in strength and capacity. Such vessels as the American steamer *Leviathan* (formerly *Vaterland*) and the English steamers *Olympic* and *Aquitania* are larger than the famous Great Eastern. Modern ocean steamers can safely carry a crew of 800 men and 2,000 passengers, besides 5,000 tons of coal, 8,000 tons of water, and 4,500 head of cattle. The following shows the gross tonnage of a few of the large steamers:

VESSELS.	DEPTH.	BRDTH.	LGTH.	TONS.
Agamemnon	38	72	678	19,400
Celtic	42	75	700	20,175
Mount Vernon	43	76	702	20,200
Baltic	49	75	725	23,000
Mauretania	51	88	760	32,500
Columbus	52	92	765	35,000
Olympic	52	92	890	45,000
Aquitania	52	92	901	47,000
Leviathan	56	100	950	59,956

SHIP RAILWAY, the name applied to a railway constructed for the transportation of ships from one body of water to another, the object being to overcome long tours by water. These means of transportation are not numerous in modern times, but were used quite extensively by the natives. The Greeks operated a railway of this kind across the Isthmus of Corinth as early as 425 B. C. and transported vessels 150 feet long in this way. De Lesseps proposed such a railway across the Isthmus of Suez in 1860, but he finally substituted for it the present Suez Canal. Captain Eads projected a ship railway across the Isthmus of Tehauntepec, in Mexico, in 1879. He proposed to transport ships 350 feet long in cradles running on 1,380 wheels at the rate of six to ten miles an hour. Congress failed to give financial support to the

project and it was abandoned after the death of the promoter.

A ship railway was proposed across the neck of land between Chignecto Bay and the Gulf of Saint Lawrence, a distance of fifteen miles. Work was commenced on this road in 1888, but was abandoned after three years on account of a lack of funds. The purpose was to run cars under the ship, into the water, and carry it on steel cradles at a speed of about ten miles an hour, the cars to be drawn by locomotives. No modern ship railway of material size has been successful, and the project has been displaced either by the construction of canals or the operation of railways.

SHIPTON, Mother, a reputed prophetess, born in Yorkshire, England, in July, 1488. In 1645 a collection of her prophecies was published and in 1660 she was alluded to in a comedy. The most famous of her prophecies is the one made public in 1641, which indicated the fate of Wolsey and Lord Percey, foretelling that the former would not live to reach York. It is considered that this prophecy was fulfilled, since he was arrested at Cawood shortly before his installation as Archbishop of York. A set of rhymes published in 1862 was formerly assigned to her, which foretold that the end of the world would occur in 1881, but they were written by Charles Hindley.

SHIPWORM, or Teredo, the name of a wormlike mollusk, so called from its boring into the timbers of vessels below the water line. It is from one to three feet in length and the body is covered with a shell consisting of two valves. The shell is not large and only covers a part of the body and in some species is reduced to mere appendages of the foot. These mollusks attack wood immersed in sea water, whether of ships or piers, and bore in the direction of the grain. They carefully avoid the tube or opening made by their neighbors and swallow the dust of the rasped wood. Reproduction takes place through an ovoviviparous process, and the young attach themselves to the wood and begin to bore at an early age. These mollusks are highly detrimental to piles, wharves, wooden ships, and fish traps.

SHIRAS (shī'ras), **George,** American jurist, born in Pittsburg, Pa., Jan. 26, 1832; died Aug. 2, 1924. He studied at Yale University, where he graduated in 1853 and, after studying law in the Yale Law School, was admitted to the Pennsylvania bar. He practiced successfully in Pittsburg, being associated with many important cases, and in 1892 was appointed an associate justice of the United States Supreme Court by President Harrison. Yale University granted him the degree of LL. D. in 1883. He was one of the judges who decided against the constitutionality of the income tax in 1894. In 1903 he retired from the bench.

SHIRAZ (shē'räz), a city in Persia, capital of the province of Farsistan, 164 miles northeast of Bushire. It occupies an elevated site 4,500 feet above sea level and is surrounded by magnificent orchards, vineyards, cypress groves, and rose gardens. The city dates from 697 A. D., when it was founded on a favorite site as a resort for Persian princes, and through all the succeeding centuries its fame has been proclaimed in Persian poetry. A wall four miles in length surrounds the city, inclosing many beautiful mosques, palaces, and institutions of learning. It has manufactures of wine, rosewater, cutlery, silk, cotton and woolen goods, firearms, glass, and earthenware. The trade is extensive and it is visited by many large caravans. Tamerlane captured Shiraz in 1387. In 1812 and 1853 it suffered greatly by destructive earthquakes, fully 12,000 people losing their lives. Among the eminent poets and scholars who claim it as their birthplace are Hafiz, Sibuyah, and Saadi. The tombs of Hafiz and Saadi are in its neighborhood, and 35 miles northeast are the ruins of the ancient city of Persepolis, which was occupied as the capital of Persia under Xerxes and Darius. Alexander the Great destroyed Persepolis, but remains of their palaces may still be seen. The population of Shiraz is estimated at 48,460.

SHIRE (shē'rā), a river in the southeastern part of Africa, the outlet of Lake Nyassa. It has a southerly course of 250 miles, entering the Zambezi about 90 miles above its mouth. The upper course is obstructed by many rapids and cataracts, where the fall is 1,200 feet in a distance of 35 miles, but the lower part is navigable for large vessels.

SHISHAK (shī'shăk), the name of a number of monarchs of Egypt, classed in the twenty-second or Bubastite dynasty, thought to have been of Semitic descent. Shishak I. is mentioned in the inscriptions placed on the portico of the great temple of Karnak by the Bubastite dynasty and on several statues to the goddess Pasht. When Solomon pursued Jeroboam, the latter fled to Shishak for protection, but after the death of Solomon he became sovereign of the newly formed kingdom of Israel, which was separated from Judah at that time, and Rehoboam was made king of the latter. It is evident from monumental inscriptions that Shishak marched to Jerusalem against Rehoboam in the fifth year of the latter's reign, and after taking the city carried the treasures of the temple to Egypt. Scenes from this conquest of Jerusalem are recorded on the monuments of Karnak.

SHITTIM (shĭt'tĭm), the wood of the shittah tree, which is mentioned several times in Exodus and Deuteronomy. This wood was used principally in building the tabernacle and is identified with the *Acacia seyal* found in the vicinity of Sinai and the Dead Sea. It is hard, has a fine orange-brown color, and is not attacked by insects. The tree has small leaves and grows to a height of twenty feet.

SHODDY. See **Rag Trade.**

SHOES, articles of wear for the feet, made mostly of leather, but also of several other materials. The Egyptians, Greeks, and other

SHOES.

1, Italian Sandal; 2, 12th Century; 3, Italian Shoe; 4, 15th Century; 5, Catherine de Medici; 6, Venetian; 7, 17th Century; 8 and 9, 18th Century; 10, Louis XVI; 11, French Shoe, 18th Century; 12, 19th Century; 13, 14 and 15, Modern.

ancient peoples wore a rudimentary shoe, consisting mainly of a sole held on the feet by straps. Any one of this class of footwear is known as a *sandal.* For centuries the Egyptians wove a kind of shoes with strips of papyrus, which they painted and ornamented with remarkable skill. It was customary to wear the sandal in Rome, but later coverings were provided for the whole foot. Subsequently the Roman footwear was made more durable for army service by protecting the soles with nails and metallic plates. The manufacture of shoes is an important industry in Canada and the United States, and those produced are manufactured almost exclusively of leather. They are largely made by machines, but the best kinds are hand-sewed. In shoemaking it is necessary to use several kinds of machines, some fitted to stitch the sole and others designed to sew the upper parts. Ingeniously constructed machines are employed for pegging the soles. The American Indians made buckskin shoes called *moccasins.*

Boots are a modified form of shoes, having the upper leathers lengthened to form a protection for a part of the leg, while *slippers* are a low form used largely for indoor wear. In Holland, France, and other countries of Europe shoes are made to some extent of wood; in Japan, of paper and plaited straw; and in many tropical countries, of plaited grass and hemp. It would be difficult to enumerate all the different kinds of shoes worn, since the art of dressing the feet for comfort, convenience, and fashion is quite as notional as the apparel fitted for other parts of the body. In China the foot of the females of certain classes is compressed from early youth, and the shoe worn by the adult of those classes is only five or six inches long. Among the remarkable matters of interest to be observed in the shoe trade is the fact that there has been a wonderful revolution in the art of making and repairing shoes, the factory-made product having almost entirely driven the boots and shoes of the hand manufacturers from the market.

SHOGUN (shō'gōōn), or **Tycoon,** a military title of Japan, first employed in the 1st century before the Christian era, when Emperor Suijin divided the empire into four divisions. The power of the four military rulers was gradually enlarged until 1603, when they became the ruling element in the country. However, the office of shogun was abolished after the revolution of 1608. In that year the emperor, or Mikado, was restored as the central power of the nation.

SHONTS, Theodore Perry, public man, born at Meadsville, Pa., May 5, 1856. His parents moved to Iowa in the early sixties and settled at Centerville, where he attended the public schools. He studied at Monmouth (Illinois) College, graduating in 1876, and the same year went into the banking business at Centerville. Subsequently he studied law and became a member of the law firm of Drake, Baker & Shonts, practicing four years, and in 1882 superintended the construction of the railway from Albia to Centerville, now a part of the Iowa Central system. Later he was president of the Toledo and Western Railway and a director of several banks and manufacturing enterprises. In 1905 President Roosevelt appointed him

THEODORE P. SHONTS.

chairman of the Panama Canal Commission. He resigned the chairmanship in 1907 to become president of the Interborough Rapid Transit Company, New York. He died Sept. 21, 1919.

SHOOTING, the practice of competing in marksmanship with the rifle, pistol, and other small arms. It is an exercise of value in securing proficiency and accuracy in the use of firearms. Contests with the military rifle have been in vogue for many years, and several associations are maintained to promote the exercise both for sport and to secure development in accuracy. The first annual competition was held in the State of New York in 1873, and since that time national and international contests have been numerous. The Palma trophy has been the object in competitive tests at various times. It was won by an American team in Ireland in 1880, by a Canadian team in 1901, by a British team, at Ottawa, in 1902, and by an American team, at Bisley, England, in 1903. The American team won the international Palma medal at Ottawa, Canada, in 1907. Shooting is a part of the competitive tests at the international Olympia games. The Olympia contests held at Bisley, England, were won by American rifle shots in 1908.

SHORTHAND, or Phonography, any system of handwriting that reduces the number of muscular movements required to keep pace with uttered speech. It differs from longhand in that characters are used to represent words, parts of words, or sounds instead of all the elementary sounds of words. The art is of great antiquity, having been employed by the ancient Greeks and Romans, both to secure brevity and secrecy, but all traces of ancient systems were lost in the Middle Ages. At present four distinctively different systems are in use, including *phonography,* or sound writing; *stenography,* or compressed writing; *tachygraphy,* or quick writing; and *brachygraphy,* or short writing. The underlying principles of these processes have led to the publication of fully 300 different methods or systems, all possessing more or less value in writing the various languages now spoken. Timothy Bright published the first modern system of shorthand in 1588, which made use of marks instead of letters of the alphabet. The system published by Peter Dales in 1590 used characters to denote words. These were superseded in 1602 by a system of shorthand devised by John Willis, who adopted arbitrary signs, thus introducing to some extent the elements employed by the more practical systems now in use.

Isaac Pitman published his work on shorthand in 1837 and was the first to use the word *phonography.* His system is based on the sounds of the English language. It rapidly superseded other systems and was adapted to be employed in many foreign languages, among them the German, Dutch, French, Italian, Japanese, Spanish, and many others. He used 41 letters to represent the elementary sounds, six long and six short vowels, five diphthongs, and 24 consonants. Double and treble consonants for abbreviating the writing were made by hooks and circles at the beginning and end of the consonant strokes. This system rapidly revolutionized shorthand writing, being well adapted to secure legibility as well as the greatest degree of brevity. Since its publication many other systems have been either modified from Pitman's or originated independently, but the Pitman system is still a standard.

Shorthand is now taught in all the business and commercial schools and has found a place in many of the secondary, special, and public and private high schools. It is employed largely in reporting speeches, in newspaper and court reporting, and in general office work. Among the leading systems in America are those of Cross, Gregg, Pernin, and McKee. The first mentioned, originated by J. G. Cross and known as *Cross's Eclectic Shorthand,* is based largely upon strokes and their position. This work has been published in more than sixty editions. Another system, called *Longley's Eclectic Phonography,* is in extensive use. The number of words and syllables uttered by a speaker in a specified time varies largely in individuals and in different languages. Usually from 75 to 180 words per minute may be taken to represent the extremes in the English language, while the average number of words is about 100 per minute. In competitive tests the record is from 200 to 280 words per minute, but this pace can be maintained only for ten or fifteen minutes in succession. A skillful reporter is able to take fully 150 words in a minute and usually transcribes that number on the typewriter in three minutes, thus averaging about fifty words per minute in the completed manuscript.

SHOSHONE FALLS (shŏ-shō'nē), a remarkable cataract in Idaho, on the Snake River. The current is about 950 feet wide and falls in the form of a semicircle, the height being about 210 feet, exceeding the Niagara Falls 40 feet. Precipitous walls of rock fully 1,000 feet high form barriers on both sides of the river, and four miles up the river are the Little Shoshone Falls, thus giving the region a remarkably interesting aspect. See **Snake River.**

SHOSHONES (shŏ-shō'nēz), or **Snakes,** an American Indian tribe, formerly resident in the region now occupied by Utah, Idaho, and Nevada. They include a number of bands, among them the Buffalo Eaters and White Knives. Lewis and Clark first came in contact with them while penetrating the regions beyond the Rocky Mountains in 1805 and found them a peaceful class of natives. The advancement of settlers was the occasion of hostilities near the Humboldt River and Great Salt Lake in 1849, and these were succeeded by battles in 1863. A treaty was made with them in 1867, when the government assigned them land in

sections of Nevada, Utah, Idaho, and Wyoming. They include about 5,750 at the present time, numbering among their membership many of considerable advancement in education and the arts. Christian missions have been conducted among them with some degree of success.

SHOT, the general name applied to pellets and bullets used in firearms of various kinds. Round stones were first employed for shot when powder came into use, but it was soon found that a regularly formed ball made of metal is more convenient and far more effective for all purposes. Solid shot is not used as extensively as formerly, but hollow projectiles are employed instead. The size of the shot varies materially with the kind of guns from which it is to be thrown, ranging from very small pellets to projectiles weighing about a ton. The material used is cast iron or steel, but the missiles are prepared differently, depending upon the purposes for which they are to be employed. They include canister, grape, shrapnel, bar, and numerous others.

Canister shot is made up of small iron or lead balls placed in a sheet-iron can, and is designed to burst on leaving the gun. *Grapeshot* is made of a number of small cast-iron balls, so adjusted that they may be thrown in a body from the gun. *Shrapnel shot* is made by placing a number of musket balls in a cast-iron shell and filling the intervening spaces with sulphur or resin. This material is added to harden and form the balls into a solid mass, and powder is afterward placed within to burst the shell on striking the object against which the shot is thrown. *Bar shot* is employed to destroy the rigging of a ship. It consists of discs of iron joined by a bar, but a chain is sometimes used for a like purpose.

Sportsmen use pellets of lead of various sizes, this depending upon the kind of game hunted. The finer grades are more serviceable for small animals, as they are less likely to damage the flesh, while larger classes are needed to kill more bulky game, such as geese and brants. Shot of this kind is made by melting the lead and dropping it through sieves from a high tower into water. The dimension of the shot depends on the size of the hole of the sieve or colander through which the metal passes. As they fall through the air they become cooled and hardened. Shot towers vary in height from 100 to 150 feet. After dropping the shot from the top, it is separated according to the different sizes and polished. A newer process is to mold the metal by running it in a molten state into a trough and allowing it to drop through little holes into molds, which discard the pellets as soon as formed and drop them into a bed of graphite.

SHOTGUN, the name of a weapon used for hunting small game, such as squirrels, rabbits, grouse, and waterfowls. Weapons of this class formerly had a single barrel and were loaded by passing the ammunition into the muzzle, for which purpose a ramrod was attached to the lower part of the barrel. Later it was superseded by the double-barrel shotgun, in which two loads were entered from the muzzle, and both styles were fired either by the flint-lock or by percussion caps. The first breech-loading gun was invented in 1836. This weapon consists of one or two barrels that open at the breech, working on a hinge, and the charge is placed in shells made of brass or partly of brass and partly of paper. These shells contain the powder and shot and in the rim is the percussion cap, which is ignited by means of a hammer or a mechanism in the breech. The newer shotguns have a single barrel with a magazine beneath. They are loaded and fired in the same way as the repeating rifle. The best barrels are made of Damascus twist, or laminated steel, and the sizes usually are 10 or 12 bore. Some shotguns have a metallic stock or shoulderpiece, but most of them are of a fine grade of wood, and some contain a small cavity in which to carry shells. See **Gun.**

SHOVELER (shŭv"l-ẽr), or **Spoonbill,** the name of several species of duck, so called from the form and size of their bill. The common shoveler, though smaller than the mallard, is highly esteemed for its flesh. The female has dull plumage, but the male is finely decorated, having a white breast and greenish tints on the tail coverts and the head. It is not related to the true spoonbill, which is a wading bird of the heron family.

SHOWERS OF FISHES, a peculiar occurrence sometimes seen in various regions, particularly in tropical latitudes. Among the instances of this kind is a shower that fell near Merthyr-Tydvil in Wales, where shall fishes were found over an area of several square miles shortly after a rainstorm. Another instance occurred in the Isle of Mull, in which herrings were found 500 yards from the sea, and when first seen they were still alive. The phenomenon is due to the circumstance that large columns of water are often taken up by whirlwinds and carried at a considerable elevation some distance from the sea, where the water falls to the ground accompanied by the fishes taken up from the sea. In tropical countries many bodies of water dry up, and fish and other living forms remain alive at some distance below the surface of the dried mud, but revive fully when the basin is again filled with water. This explanation accounts for the rapid population of these water beds with fish, instead of falling from the clouds, as some suppose.

SHREVEPORT (shrēv'pōrt), a city in Louisiana, capital of Caddo Parish, on the Red River, 300 miles northwest of Baton Rouge. It is on the Kansas City Southern, the Texas and Pacific, the Saint Louis Southwestern, the Queen and Crescent, the Missouri, Kansas and Texas, and other railroads. The site consists of ele-

vated and gently rolling ground. Among the features are the parish courthouse, the Federal building, the Shriners' Hospital, the Byrd High School, the First National Bank, the Slattery building, and the Commercial National Bank. It has a large trade in cotton, lumber, fruit, and produce. Natural gas is found in the vicinity. The manufactures include cotton goods, cigars, ice, lumber products, cotton-seed oil, bread, hardware, and machinery. The utilities include gas and electric lighting, sanitary sewerage, pavements, waterworks, and electric street railways. It was settled in 1833 and incorporated in 1839. Population, 1900, 16,013; in 1920, 43,874.

SHREW (shrụ), a genus of animals resembling the mouse and the dormouse, but distinguished from them in having soft fur and an elongated muzzle. A large number of species have been enumerated, of which the *common shrew* is the best known. It is about the size of a mouse, but has a prolonged muzzle, small

WATER SHREW.

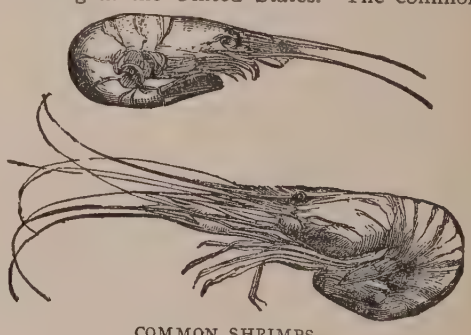
eyes, and a four-sided tail. The ears are short and the color is brownish-black. The food consists of insects, worms, and the smaller mollusks. These animals come out in search of food at night and are noted for their tendency to fight, the stronger often killing and eating their weaker opponents. The *shrew mole* of North America includes several species and is very nearly allied to the moles. Several species are common to Europe, all more or less similar to the American species, but differing from them in various respects, especially in being larger and having longer legs. The *water shrew* is larger than the American shrew mole and the snout is quite pointed. It is frequently seen on the banks of streams and lakes, often entering the water. Some species burrow in the fields and gardens in search of worms, which is true of the American shrew mole.

SHRIKE, a genus of birds of the insessorial family, widely distributed in America, Europe, and other continents. The food consists of insects, frogs, mice, and small birds, receiving from their habit of killing other birds the name of *butcher bird.* The *great American shrike* is about ten inches long. It has a grayish color with whitish markings, and is able to imitate the voice of other birds. About thirty other American species have been described, some of which are native to South America. The *red-backed shrike* of Europe is about eight inches

AMERICAN SHRIKE.

long, and the *great gray shrike* of Asia and North America approaches the thrush in size.

SHRIMP, an extensive genus of ten-footed crustaceans. They resemble the lobster and crawfish, but differ from them in having an elongated, tapering, and arched form. The claws are small, the rostrum is short, and the tail is long and fanlike. Their whole structure is delicate, many species resembling in hue the objects near which they develop, thus escaping easy observation. They burrow in the sand by a peculiar motion when alarmed, or seek safety by hiding under rocks and pebbles. The size is from two to three inches in length. Shrimps are a favorite food in many European countries, and on boiling assume a brownish color. They are widely distributed, but are most abundant in tropical waters, and are used chiefly as bait for fishing in the United States. The common



COMMON SHRIMPS.

shrimp is caught by large nets with a semicircular mouth.

SHROVETIDE (shrōv'tīd), the days immediately preceding Ash Wednesday, at which time Roman Catholics were accustomed to confess their sins as a preparation for Lent. Shrove Tuesday was made a season for feasting and merriment, and is still called *Mardi Gras* by the French.

SHUBRICK (shū'brĭk), **William Branford,** naval officer, born on Bull's Island, S. C., Oct. 31, 1790; died in Washington, D. C., May 27,

1874. He served on the *Hornet* and *Constellation* in the War of 1812, aiding in the defense of Norfolk against the British. Later he commanded in the West Indies and in the Mexican War. From 1854 to 1858 he was chairman of the lighthouse board, and in the latter year took command of an expedition against Paraguay to obtain reparation from that country for firing on the steamer *Water Witch*. He retired with the rank of rear admiral in 1862, but served as chairman of the lighthouse board until 1870.

SHUFELDT (shū'fĕlt), **Robert Wilson,** naval officer, born in Red Hook, N. Y., Feb. 2, 1822; died Nov. 7, 1895. In 1839 he became midshipman in the navy, and by 1854 rose to the rank of lieutenant, but resigned in the latter year to become chief officer of a transatlantic steamship line. He was United States consul general at Havana in the first part of the Civil War, but in 1863 reëntered the navy and commanded the steamship *Conemaugh* in the blockade of Charleston, S. C. From 1864 to 1866 he had command of the steamer *Proteus* and in 1870 became commander of the monitor *Miantonomoh*. He sailed to Africa and the East Indies in 1879 to promote American trade interests with those countries. In 1883 he was made rear admiral and the following year retired from the service. The Sultan of Zanzibar, Said Barghash, presented him with a sword.

SHUFFLEBOARD (shŭf'f'l-bōrd), or **Shovelboard,** a game played by two or four persons with iron weights, on a board sprinkled with fine sand. Two sets of four weights, weighing about eight pounds each, are used in the game. The board is thirty feet long and has raised edges. A line is drawn across the surface about five inches from each end. A set of weights is used by the players, who divide into opposing sides, and the game consists of sliding the weights in rotation along the board. Twenty-one points comprise the game. One score is given for the piece nearest the line; two, for the piece between the line and the end; and three, when the weight projects partly over the edge of the board. On the deck of ocean steamers the game is played on a figure chalked on the deck. In that case wooden weights are used, and they are pushed by a long staff with a curved end. Exactly fifty points are required to win the game, and if more scores are made they are deducted instead of added.

SIAM (sī-ăm'), an independent kingdom in Southeastern Asia, including a part of the Malay Peninsula and a part of the Indo-Chinese Peninsula. It is bounded on the north by Burma and French Indo-China, east by French Indo-China, south by Cambodia, the Gulf of Siam, and the Straits Settlements, and west by the Indian Ocean and Burma. The long and narrow strip extending south is known as Lower Siam, which comprises about one-fourth of the country, and the compact region in the north is termed Upper Siam. Within recent years the British have encroached upon the northwest and southwest, while the French have made acquisitions in the east. The total area is given at 236,000 square miles.

Description. A large part of the country lies in the basin of the Menam, which has many navigable tributaries, forming a drainage system of considerable importance. Much of the surface consists of alluvial deposits of great fertility, especially in the region of the Lower Menam, where the river divides into numerous channels that overflow in August and bring a fertility exceeding that of the Lower Nile. The Menam valley proper is about 450 miles long. It has an area of about 23,000 square miles, of which fully one-half is directly influenced by the inundations. This river has its source among the mountains of China, the upper region being considerably elevated and arid. Ranges of hills extend along the western border, but the general elevation of the country does not exceed 600 feet. Extensive jungles and briny swamps characterize a portion of the coast bordering on the Gulf of Siam.

A small part of the western boundary is formed by the Salwin River and the eastern section is drained by the Nam Mun, which flows east and joins the Me-kong in French Indo-China. Along the Gulf of Siam are a number of important inlets, which enlarge the total coast frontage to 1,100 miles. The surface rises gradually toward the source of the rivers, forming in the north an elevated and more or less hilly tableland. Tonle Sap Lake, in the southeast, extends into Cambodia. Much of the surface is covered with extensive forests, including teak, sappan, aloes, rosewood, palms, mangosteen, and ebony.

The climate of Lower Siam is influenced favorably by the sea breezes and is highly salubrious and equable. Toward the north the summer heat is quite oppressive and from November to May very little rain falls. At Bangkok the precipitation is 50 inches, but in some sections it amounts to 235 inches per year. The temperature ranges from 65° to 90°, but in the northern part it falls to 40°. Monsoons sometimes sweep across the country with considerable force.

Industries. Agriculture is the chief occupation and rice is the principal product and the national food. It is grown extensively in the lowlands of the south, where large areas are sufficiently moist to yield abundantly. Considerable interests are vested in growing coffee, tobacco, pepper, hemp, rice, and sesame. Other productions include rattan, mangoes, bamboo, and many species of tropical fruits. The country is rich in mineral resources, especially in coal, iron, copper, gold, and precious stones. Other minerals include antimony, tin, zinc, lead, granite, and limestone. The live-stock industry is confined largely to the rearing of sheep, elephants, camels, buffaloes, and poultry. Siam is

noted for its large and beautiful elephants, including the tawny and white species, both of which attain points of superiority. Wild animals are abundant, including the otter, leopard, tiger, crocodile, rhinoceros, wild hog, and orang-outang. Birds of fine plumage and song are abundant. The fisheries yield many marketable species.

The manufacturing enterprises are managed largely by European capital, principally by British, Germans, and French. Rice mills are numerous and considerable capital is invested in the manufacture of sugar from cane, fine textiles, glassware, pottery, jewelry, and lumber. Great Britain, Germany, and China have the largest share of foreign commerce. The exports include rice, teak wood, fish, hides, pepper, and fruits. Among the principal imports are cotton manufactures, gunny-bags, hardware, machinery, opium, silk goods, and merchandise. The transportation facilities are chiefly by water, including coastwise communication and navigation on the Menam, the Salwin, and the Me Ping, a branch of the Menam. About 950 miles of railroads are in operation, the larger part of which is owned and operated by the government. Electric railways are operated in Bangkok and several other cities.

Government. Siam is an absolute monarchy, but the king is aided by ministers of state, who in part compose a legislative council. The ministers are appointed by the crown and constitute the heads of national departments, including those of foreign affairs, justice, finance, war, interior, marine, police, public works, and public instruction. Fifty-one members constitute the legislative council, whose members, including the ministers, are chosen by the king. For the purpose of localizing the government, the country is divided into eighteen provinces and these are subdivided into districts. A certain degree of independence is maintained by the Malay States, which are governed by rajahs under the direction of commissioners. Certain forms of slavery and feudal land ownership are maintained.

Siam is considered next to Japan in adopting modern methods and progressive educational reforms. The government has extended encouragement to the development of industries by Americans and Europeans. Both the dress and customs of Europeans have been largely adopted and many young men are sent to Europe for their education. European teachers and officers are employed in large numbers by the government. The higher classes are considerably advanced in learning, while elementary education is practically universal. No restrictions have been placed upon the construction of railroads, canals, and electric lines, and the general adoption of European machinery and educational ideas. All Siamese between the ages of 18 and 21 are required to serve in the military or naval forces.

Inhabitants. The Siamese are classed with the Mongolian family and show a close relationship to the people of Anam and Burma. Their skin is darker than that of the Chinese, but lighter colored than that of the people native to Western Asia. In stature they average about five feet four inches. They are kind-hearted, tolerant, and polite, but are inclined to be indolent, vain, and superstitious. Bangkok, on the Menam, is the capital and largest city. Other cities include Paknam, Chantabon, Ayuthia, and Korat. A large part of the inhabitants is composed of Chinese and Malays. Population, 8,125,000.

History. Little is known of the early history of Siam, the popular traditions dating back only to the 5th century B. C. The credible history begins with 1350, when Ayuthia was made the capital. Commercial intercourse was established between Siam and Portugal in 1511, but soon after the Dutch came into control of its foreign trade. Cambodia was annexed in 1532 and the present dynasty, that of Yaut Fa, ascended the throne in 1782. The Burmese captured the capital about the middle of the 18th century, but were expelled by a general named Phya Tak. The country was opened to general trade in 1856 and since then the educational and industrial progress has widened constantly.

Buddhism was introduced into Siam in the 7th century B. C. and is still the principal religion, but a large per cent. of the people profess Confucianism. Christianity is gaining some foothold under a number of missions, which consists mainly of American Protestants and French Roman Catholics. The language spoken may be classed between the Malay and the Chinese, and the written characters appear to have been derived from the Sanskrit. Within recent years material progress has been made in printing in the Siamese language, which is leading to the development of an independent literature. Extensive translations from other languages, especially European and Japanese, have been made.

Chulalongkorn I., the present king, succeeded to the throne on the death of his father, in 1868. He is fifth in descent from Yaut Fa, who gave rise to the present dynasty. While he has been progressive in promoting the development of material enterprises, his government has been somewhat complicated by advances upon his territory by the French and British. In 1893 the French established a protectorate over Cambodia and later extended their sphere of influence over a large part of Upper Siam. Several provinces were ceded to France in 1907. In the same year the British established a sphere of influence on the border of Burma and another between the Gulf of Siam and the Indian Ocean.

SIAM, Gulf of, an inlet of the China Sea, lying within the confines of Siam, Cambodia, and the Malay Peninsula. The width at the

entrance is 240 miles, and it extends inland 400 miles. The Menam and several other navigable rivers flow into it, thus forming an important water surface for navigation.

SIAMESE TWINS (sī-ā-mēz'), the name of two male individuals whose bodies were inseparably connected from birth by a fleshy ligament stretching from one breastbone to the other, which had on its lower border a common navel. They were born in Siam in 1811. The father was a Chinese and the mother a Chino-Siamese. They were named Eng (right) and Chang (left). The connection was such that they faced each other at first, but the fleshy ligament became lengthened by constant strain until they finally stood side by side. When the center was touched, both felt it, but on touching toward one side the person farthest from the point of contact did not feel it. These twins were brought to the United States in 1829 and visited the principal cities of America and Europe, but later settled in North Carolina and married two sisters. The Civil War caused them to lose a large part of their fortune, which they had accumulated by exhibiting themselves, and they made a second general tour that proved highly profitable. Chang was affected by a paralytic stroke in 1870, which did not materially affect Eng, but the former became affected with a disease of the respiratory organs and died Jan. 17, 1874, Eng dying about three hours afterward. These twins attracted wide attention. Medical men of repute expressed the view that the ligament connecting them could have been severed without fatal results, particularly if it had been done at a comparatively early age.

SIBERIA (sī-bē'rĭ-ā), an extensive region of Russia, occupying the northern part of Asia. It is bounded on the north by the Arctic Ocean, east by Bering Sea and the Pacific Ocean, south by China and Russian Central Asia, and west by the Ural Mountains, which separate it from Russia in Europe. A large part of the southern boundary is formed by natural characteristics, such as the Amur River, which separates it from Manchuria; the Yablonoi Mountains, in the east central part; the Altai, in the center; and the Thian-Shan, in the west. The area is 4,832,350 square miles, which exceeds in size all of Europe.

Description. Three principal divisions have been made for the purpose of government, each under a governor general. They are Western Siberia, with an area of 860,020 square miles; Eastern Siberia, area 3,069,750 square miles; and the Amur region, area 903,580 square miles. The surface of this vast expanse is diversified by valleys and mountains, but the drainage is almost entirely toward the north into the Arctic Ocean and the Sea of Okhotsk. In the west are ranges of the Ural Mountains; in the south, the Altai and Yablonoi mountains; in the central east, the Verkhogansk Mountains; and in the east, the Stanovoi Mountains. Many of the rivers are vast water courses of importance in commerce, but the cold and long winters interfere notably with their general use in transportation. The larger of these rivers are the Obi, Irtish, Tobol, Yenisei, Khatanga, Lena, Indigirka, and Amur.

Lake Baikal, in the south central part, is the largest of many inland lakes. Other sheets of water include lakes Yege, Chang, and Balkash. In the Arctic and the adjacent seas are a number of islands belonging to Siberia, the most important being Saghalien Island, in the Sea of Okhotsk, and the New Siberia Islands, in the Arctic Ocean. The vast coast line is diversified as to contour and outline, ranging from sand dunes to precipitous cliffs, but the Arctic Ocean is ice-bound about ten months of the year. On the other hand, the Sea of Okhotsk is generally wrapped in dense fogs and endangered by icebergs, thus making navigation impossible during most of the year. The summers are warm and pleasant, but the winters are extremely cold. However, the climate is generally healthful. It is quite agreeable to Europeans in the southern portions. Much of the surface possesses fertility of soil. Siberia has much deposits of minerals, and in the southern portion of the country are valuable forests. Between the Obi and Irtish rivers and in several other sections are vast marshes, and in the north are the tundras, which are made up of frozen swamps that thaw only on the surface in the summer. The forests gradually decrease toward the north, where they assume the form of small shrubs and vegetable forms, and finally merge into small plants and mosses.

Resources and Industries. Siberia has a diversity of products. They are being developed rapidly under the vigorous policy of the present reigning monarch of Russia, who is fostering the building of railroads and canals and the development of its mineral and other natural resources. Fur-bearing animals are numerous. The country has valuable fisheries and vast swarms of wild fowl. The wild animals include sables, reindeer, ermines, elks, foxes, deer, bears, lynxes, wolves, antelopes, and marmots. Among the minerals are iron, copper, gold, silver, mercury, tin, lead, coal, graphite, sulphur, salts, mica, petroleum, and precious stones. Siberia has vast and valuable forests of northern species, including the oak, pine, fir, cedar, and many others. Agriculture and stock raising are the principal industries.

Siberia is regarded by many economists as the future source of wheat and beef for Europe. The leading soil products include wheat, corn, oats, barley, hemp, vegetables, and small fruits. Horses, cattle, swine, sheep, mules, and poultry are reared in abundance. Manufacturing has developed remarkably since the building of the Trans-Siberian Railway. The chief manufactures are furniture, flour, hardware, lumber,

paper, cured fish, leather, machinery, and products connected with the mineral deposits. It has a vast trade with European Russia, the latter receiving large quantities of fish, furs, grain, tallow, hides, and lumber. Russia transports to Siberia such products as machinery, clothing, chemicals, and other manufactured wares. Considerable trade is carried on with China, Corea, Manchuria and Japan.

GOVERNMENT. The vast region of Siberia is politically organized on a somewhat diversified plan. In general the divisions are governed like the provinces of Russia in Europe, but some are grouped under imperial viceroys. Eastern Siberia has its seat of government at Irkutsk and is under an imperial viceroy. The Amur territory, located northeast of Manchuria, is governed from Vladivostok, on the Sea of Japan. Western Siberia is divided into the two provinces of Tobolsk and Omsk, of which the two cities of Tobolsk and Tomsk, respectively, are the capitals. The national government maintains a system of education for instruction in the elementary and industrial branches. Several colleges and universities receive national support, the most important university being at Tomsk, located on a branch of the Trans-Siberian Railway.

INHABITANTS. About 60 per cent. of the inhabitants are Russians. This element includes a large number who descended from exiles who were transported to Siberia for political offenses. A small element of other Europeans is in the country, including chiefly Poles, Finns, and Germans. The natives consist largely of Turks and Mongols, the former predominating in the southwestern and the latter in the southeastern sections. Many Tartars inhabit the region in the vicinity of Lake Baikal, and native Yeniseians are scattered more or less generally in the basin of the Yenisei River. Tunguses inhabit a large section of Eastern Siberia. An element known as Pale-Asiatics is scattered more or less throughout the region of Lake Baikal, and these peoples include the Koriaks and the Kilyaks.

The Russians generally adhere to the Greek orthodox church, but a number of Protestant communities thrive. The Asiatics adhere chiefly to the Moslem and Buddhist faiths. The principal cities include Tobolsk, Omsk, Tomsk, Irkutsk, and Vladivostok. A majority of the inhabitants reside in Western Siberia, but the construction of railways has influenced settlements farther east. In 1897 the population was 5,627,090. No reliable statistics have been published by the government, but a heavy immigration from Russia in Europe has been going on the last decade. In 1922, the population was estimated at 10,842,000.

HISTORY. The primitive inhabitants of Siberia are known as Yeniseians, so named from their occupation of the Yenisei basin. They were succeeded by tribes invading the region from the south. The advancement of early Siberians in civilized arts is attested by numerous earthworks and mounds. In the 11th century the Turks conquered the region, but they were driven from the country by the Mongols in the 13th century. Russian Cossacks made invasions from the west in 1580 and established trading posts, but soon turned their possessions over to Ivan the Terrible. The country became a productive furring region for Russian hunters, who penetrated east to Kamchatka by the 18th century. It was long the hope of Russian czars to direct emigration into Siberia, for which purpose it was made a penal colony, and for centuries thousands of exiles and convicts were sent there, a practice continued until 1899. The Amur territory and the coast region of Manchuria were finally ceded to Russia by China in 1860. Other extensions have been made in recent years toward the south of West Russia, including portions of Turkestan and Afghanistan. The abandonment of Siberia as a penal colony resulted from the intention of the Czar to develop it into a region of vast enterprise tributary to the western part of the empire, and since then fully 200,000 emigrants have made settlements annually. The Trans-Siberian Railroad, extending from Saint Petersburg to Vladivostok, a distance of 4,950 miles, is considered the most gigantic railroad enterprise in the world. Other important railroad lines include the Trans-Caspian and branch lines from each of the two great railways. Siberia took an active part in the Great European War until 1917, when Nicholas II. was deposed and imprisoned at Tobolsk, after which the country was disturbed by local wars and incursions of Chinese and other Asiatics.

SIBYLS (sĭb'ĭlz), in Greek and Roman mythology, the name applied to several maidens gifted with power of phophecy, who were reputed as living to an incredible age. Writers generally place their number at ten, but one known as Cumaean is the most famed from her mention in the sixth book of Aeneid. She is the reputed writer of nine books in the Greek, generally known as the "Sibylline Books," which she offered to sell to Tarquin the Proud. Not knowing who she was, Tarquin refused to buy them, upon which she burned three and returned with six, demanding the same price as before. Tarquin again refused to purchase and she burned three more, returning with the remaining three, for which she asked the same price as at first. Amazed at her inconsistency, Tarquin consulted the Augurs, who advised him to buy the remaining three at whatever price they were to be had. He found the volumes to contain valuable predictions, but the Sibyl vanished after the disposal of the books.

The Sibylline books were subsequently consulted on occasions of national danger. They were carefully preserved in the temple of Jupiter Capitolinus, but were destroyed when that structure was burned in 83 B. C. Later the

senate sent delegates to different cities of Italy and Greece to collect and, if possible, restore the Sibylline verses, but it was possible to secure only about 1,000, which received a place in the new temple of Jupiter Capitolinus. Stilicho burned this collection in 408 A. D. Another collection of so-called Sibylline oracles was written by Jews and Christians in Alexandria, Egypt, in the period between the advent of Christ and the 6th century A. D. This collection is entirely distinct from the Sibylline verses of the Greeks and Romans. It was published in fourteen books and had 4,000 lines. A revised edition was published by Gallaeus in 1689.

SICARD, Montgomery, naval officer, born in New York City in 1836; died Sept. 14, 1900. He graduated from the United States Naval Academy in 1855 and served through the Civil War, taking part in the bombardment of Fort Jackson and Vicksburg. In 1864 he was with the Union forces that attacked Fort Fisher and the following year aided in the bombardment of Fort Anderson. At the close of the war he was stationed at the Naval Academy, remaining there until 1869, when he was given a command in the Pacific fleet. From 1870 to 1878 he did ordnance duty at Washington and in New York City and in the latter year commanded in the North Atlantic squadron. He was chief of the ordnance bureau at Washington from 1881 to 1890.

SICILIAN VESPERS (sĭ-sĭl'ĭ-ạn), the name of a famous insurrection against the French in Sicily, which began on March 30, 1282, at the signal of the vesper bell on Easter Monday. Sicily and Naples had been conquered by Charles of Anjou, brother of Louis IX. of France, but his severe and oppressive rule greatly displeased the people. They applied in vain for relief to the Pope, but at length King Pedro of Aragon undertook the conquest of Sicily and took advantage of the proposal to surprise the French occupants at the ringing of the vesper bells. The inhabitants of Palermo rose against the French at the appointed signal, while other towns soon followed, resulting in the overthrow of the French and the transfer of the island to the Spanish. Men, women, and children were massacred without reserve, fully 8,000 losing their lives. In 1882 the 600th anniversary of the Sicilian Vespers was celebrated at Palermo, the aged Garibaldi being present at the time.

SICILIES, The Two. See **Sicily.**

SICILY (sĭs'ĭ-lў), an island in the Mediterranean, the largest and most populous tract of land in that sea. It belongs to Italy, from which it is separated by the Strait of Messina, a channel about two miles wide. The island is triangular in form and has an area of 9,700 square miles. On the northern coast are the important gulfs of Palermo and Castellamare and on the eastern is the Gulf of Catania. The coasts of these inlets are quite steep, but the southern coast is generally flat and quite regular. The surface is diversified with mountain ranges apparently extending from the southern part of Italy, reaching heights from 4,000 to 6,000 feet, but Mount Etna, in the eastern part, has an elevation of 10,865 feet above sea level. Orange groves, vineyards, and mulberry gardens cover the mountain slopes, while forests abound in the higher altitudes. The valleys and plains bear wheat, maize, flax, cotton, hemp, corn, tobacco, oats, barley, and vegetables.

The climate of Sicily is healthful, especially in the region of Mount Etna, which is densely populated, although it is exposed to earthquakes and volcanic eruptions. Fogs prevail along the coasts in the autumn and the summer heat is quite intense. Rainfall is abundant for the production of cereals and fruits, and snow and ice are of rare occurrence, except on Mount Etna. Among the fruits are oranges, lemons, dates, almonds, figs, olives, grapes, and pomegranates. It has a corresponding production of dried fruits and wines. The principal manufactures are wine, macaroni, soap, earthenware, dairy products, cotton and silk goods, clothing, sugar, hardware, and machinery. Sardine and tunny fisheries take a high rank. The domestic animals include cattle, horses, swine, sheep, and poultry.

Sicily has a large export and import trade, mostly with Italy, but also with other European countries and Northern Africa. Railroad building has made rapid progress. At present the island has about 500 miles of railways in operation. The principal seaports are Palermo, Messina, Syracuse, Girgenti, Marsala, and Termini. The rural population is still in a rude condition educationally, only a small per cent. being able to read and write, and brigandage and the vendetta still prevail. Caltanissetta, population 25,500, is the capital, but Palermo is much the largest and most important city of the island.

History. Two classes of people, known as the Iberian Sicani from Spain and the Siculi from Italy, were the earliest inhabitants of Sicily, but they were pressed toward the interior by colonies of Phoenicians and Greeks. The cities of Messina, Syracuse, and Agrigentum were founded by the Greeks in the 8th century B. C. These Greek settlements became so powerful that the Phoenicians were driven to the western part, and Grecian art, literature, and industry attained a preponderance of influence in the island. In the early part of the 5th century B. C. the Carthaginians became a powerful influence in conjunction with their kinsmen, the Phoenicians, and a prolonged struggle finally ended in favor of the Greeks in 480 B. C., in which the Carthaginian commander, General Hamilcar, was slain. Hannibal next led an army of Phoenicians and Carthaginians against the Greeks, and the First Punic War gave a part of Sicily to the Romans. In 212 B. C. the entire

island became a Roman province. After the decline of Rome, Sicily was invaded by the barbarian tribes from the north, the Vandals conquering it in 440 A. D. The Goths under Theodoric had possession of Sicily until 535, when it became a part of the Byzantine Empire. The Saracens conquered it in 827, holding possession for more than a century, but they were finally driven from the island by the Normans under Roger de Hauteville. His son assumed the title of King of Sicily and Italy as Roger II. in 1130, calling his dominion the kingdom of the Two Sicilies.

The *Two Sicilies* included the island of Sicily, the kingdom of Naples, and a number of islands in the Mediterranean. The line of kings became extinct in 1189 and Henry VI. of Germany, of the house of Hohenstaufen, secured the kingdom by virtue of his marriage to Constantina, daughter of Roger II., and the crown remained in the German emperors until 1264. Pope Urban IV. bestowed the sovereignty on Charles of Anjou, brother of Louis XIV. of France, in the latter year. A long contest for the throne followed. It ended favorably to the French and brought about the execution of the legitimate heir, Conradin of Swabia, in 1268. Sicily became freed from the French by the aid of King Pedro of Aragon in 1282, the contest being known as the *Sicilian Vespers,* and a separation from Naples took place, the latter coming under the Angevin dynasty and Sicily under the kings of Aragon.

Sicily remained in possession of the Aragonese sovereigns until 1505, when it was placed under Spanish dominion in the persons of Ferdinand and Isabella. Ferdinand also secured possession of Naples, and both countries remained under Spanish dominion until the War of the Spanish Succession in 1700-13, when Sicily was given by the Peace of Utrecht, in 1713, to the Duke of Savoy, and Naples became a part of Austria. In 1720 Sicily also was annexed to Austria. The Two Sicilies remained under Austrian dominion until 1734, when both Sicilies were annexed to Spain. They were a Spanish possession practically all the time until 1860, the only exception being the brief French rule in Naples from 1806 to 1815 under Joseph Bonaparte. Garibaldi gave rise to a revolution in 1860, taking Palermo on May 11 of that year and following his successes on the island with an invasion of southern Italy. He met little opposition, the people rallying to his standard, while Francis II. fled from Naples. At that time the Two Sicilies ceased to exist as a government by that name, and both joined in the new kingdom of Italy under Victor Emmanuel. Population, 1922, 3,740,860.

SICKLE (sĭk'k'l), an implement for cutting grain or grass. It consists of a steel blade which is curved in the form of a hook, and on one end is a handle fitted on a tang. In some sickles the blade is notched on one side so it has a serrated edge for cutting. The sickle is held in one hand, while the other hand is used to grasp a quantity of standing grain, which is held firmly as the sickle is applied to cut the stems. Reaping machines utilize the sickle, but it is made by attaching steel sections to a metallic bar, which is driven rapidly by the driver through the effect of geared wheels.

SICKLES (sĭk'k'lz), **Daniel Edgar,** soldier, born in New York City, Oct. 20, 1825; died May 3, 1914. He studied in the City of New York, was admitted to the bar in 1844, and three years later entered the State Legislature. In 1853 he was made attorney of New York, and the same year was appointed secretary of the American legation in England. He was elected to the State senate in 1855, served in Congress from 1857 to 1861, and entered the Union army at the beginning of the Civil War as colonel of a regiment organized in New York. He commanded in the battles of Chickahominy, Antietam, Fredericksburg, Chancellorsville, and Gettysburg, losing a leg in the last named. From 1865 to 1867 he commanded in the second military district, with headquarters at Columbia, S. C., and in 1869 became United States minister to Spain. He resigned that position in 1873 to become president of the State board of civil service commissioners in New York. In 1887 he was made commissioner of immigration, became sheriff of New York County in 1890, and was elected a member of Congress in 1892. Sickles was placed on the retired army list in 1869 with the rank of major general.

SIDDONS (sĭd'dŭnz), **Sarah,** eminent actress, born in Brecknock, Wales, July 5, 1755; died in London, England, June 8, 1831. She was the eldest of twelve children of Roger Kemble, who was the manager of a company of strolling players, thus giving her familiarity with the stage from an early age. In 1772 she married Mr. Siddons, a member of her father's company, and in 1775 appeared as *Portia* in the "Merchant of Venice," at the London Drury Lane Theater, but was not reëngaged at the close of the season. She appeared at Drury Lane a second time in 1782 as *Isabella* in the "Fatal Marriage," when she met with the most enthusiastic reception. For ten years she held the first place among the actresses of England, retiring from the stage in 1812, but subsequently gave public readings from Milton, Shakespeare, and other authors. Her greatest successes were as *Lady Macbeth* and as *Queen Catharine* in "Henry VIII." A statue to her honor was unveiled in London on June 15, 1897.

SIDEREAL TIME (sī-dē'rē-ạl), a measured portion of duration, based upon the apparent motion of the stars. A sidereal year consists of 366.2563612 sidereal days. The sidereal day contains 23 hours, 56 minutes, and 4.098 seconds. See **Day.**

SIDNEY (sĭd'nĭ), a city of Ohio, county seat of Shelby County, 40 miles north of Dayton. It is on the Miami River, the Miami and Erie Canal, and the Cleveland, Cincinnati, Chicago

and Saint Louis and the Cincinnati, Hamilton and Dayton railroads. The surrounding country is fertile. Among the chief buildings are the county courthouse, the high school, and several churches. It has a public library, electric lighting, and a municipal system of waterworks. Tile, bread, machinery, flour, brick, and clothing are among the leading manufactures. The vicinity was settled about 1800 and the place was incorporated in 1819. Population, 1920, 8,590.

SIDNEY, Algernon, statesman, born in Kent, England, in 1622; executed Dec. 7, 1683. He was a grand-nephew of Sir Philip Sidney and, after receiving a careful education, accompanied his father, the Earl of Leicester, on embassies to Denmark and France. In 1641 he commanded a force of cavalry against the insurgents in Ireland, and, being friendly to the Parliament, secured command of troops under the Earl of Manchester, receiving a severe wound at the Battle of Marston Moor. He was elected to Parliament in 1645, became Governor of Dublin in 1646, and for distinguished services received the thanks of the House of Commons in 1647 and became Governor of Dover. Though approving the execution of Charles I., he did not sign the warrant, and after the restoration of Charles II. cast his influence with the party against the crown. In 1660 he was sent on a mission to Sweden. Soon after he settled at Hamburg, Germany, because of opposition to him by the English court party, but in 1677 obtained permission to return to England. There he became implicated in political intrigues, supported the country party, and was a warm friend of William Penn, whom he assisted in preparing the constitution of Pennsylvania. He was charged with being implicated in the Rye-House plot, a scheme for murdering the king, and, after a trial that brought forth no material evidence against him, was declared guilty and executed along with several others. It was said of him that he met death "with the fortitude of a Stoic." Among his writings are "Discourses Concerning Government," "Letters to Henry Savile," "Apology," and "Essay on Virtuous Love."

SIDNEY, Sir Philip, courtier and author, born at Penshurst, England, Nov. 29, 1554; died Oct. 7, 1586. He was the son of Sir Henry Sidney and entered Oxford University in 1569, where he attained a high reputation for devoted study and scholarship. After making an extended tour through Germany, Italy, and Belgium, he returned to England. He became a special favorite of Queen Elizabeth, largely through the influence of his uncle, Robert Dudley. The Queen sent him on an embassy to the court of Vienna in 1576, but he lost her favor for a time by opposing her proposed marriage with the Duke of Anjou and defending his father in his differences with the queen. His first writings were made public in 1580, when he published a romance entitled "Countess of Pembroke's Arcadia," a work full of the spirit of chivalry.

In 1585 the queen appointed him Governor of Flushing. He immediately proceeded to the Netherlands to take charge of the office, and at once became implicated in the war waged by Spain against Holland. While commanding the Netherlands cavalry at Zutphen, on Sept. 22, 1586, he received a mortal wound and died shortly after at Arnheim. Sidney possessed the elements of a great statesman and soldier and, after living nobly, he died a hero. It is undoubtedly true that the charm of his life has led to an overestimate of the worth of his writings, though they possess no mean value. His fame in literature rests upon his "Defense of Poesy," a work in which he set forth the worth of the poet against the doctrine of the radical Puritans of that day, who were inclined to denounce whatever contributed to the taste for the beautiful. Another work of considerable merit is his "Astrophel and Stella," a collection of sonnets. It was among the first works of this kind to be published in the English. In 1725 his "Complete Works" was published in London.

SIDON (sī'dŏn), or **Zidon,** anciently an important city of Phoenicia, on the eastern coast of the Mediterranean, about midway between Tyre and Beyrout. It occupied an imposing site between Mount Lebanon and the sea, and its importance was such that the entire region surrounding it was commonly spoken of under its name. It is thought that the city was founded in 1600 B. C. and that its greatest prosperity was from 1600 to 1200 B. C. For 350 years it ranked as the principal city of Phoenicia, extending its colonies and commerce to all the lands of ancient times. The city was able to withstand the assaults of the Israelites under Joshua, and never came wholly under the dominion of the Jewish nation. At length it was conquered by Tyre, but under the Assyrians, Persians, and Chaldeans retained local independence. At the time Alexander the Great invaded Syria, in 333 B. C., it enjoyed much prosperity and willingly surrendered to that conqueror. Subsequently it lost prestige under the Syrians and Romans, and in the Middle Ages was taken by the Crusaders. The site of this renowned city is occupied by Saida, a seaport of considerable enterprise. It has manufactures of cotton and silk textiles, glass, dyes, and pottery, and a considerable export and import trade. Population, 11,685.

SIEGE (sēj), the location of an army before or around a fortified place for the purpose of compelling the garrison to surrender. The forces that invade a country resort to a siege not only to capture a stronghold of the enemy, but with the additional purpose of preventing the receipt of supplies and reënforcements. Sieges are either by the army or navy and sometimes by both military and naval forces, though where ships are employed the investment partakes of the nature of a *blockade.* An assault is usually made instead of resorting to a siege, unless it is apparent the former would be impossible or

result in an unusual loss of life. The besieging party usually approaches a fortified place by passages and advanced works, which cover the besiegers from the fire of the enemy. In many cases bombs are thrown at intervals against or upon the fortified position. Those within the fortification, in anticipation of a siege, frequently locate mines at convenient intervals, to be exploded by electric wires on the approach of the enemy. On the other hand, the besiegers frequently tunnel under the walls and attempt to destroy them by firing mines.

The siege of La Rochelle under Cardinal Richelieu, in 1628, which covered a period of fourteen months, is a notable investment of the Middle Ages. The French and Spanish besieged the rock of Gibraltar for four years, beginning in 1779. The German army besieged Metz during the Franco-German War, in 1870, and after a blockade of seventy days received the surrender of 173,000 men. The siege of Plevna, in 1877, was a prominent feature of the Russo-Turkish War. Port Arthur was besieged and captured by the Japanese in 1914. The Russians captured Przemysl and the Germans captured Warsaw and other forts by sieges in 1915.

SIEMENS (sē'mẹnz), **Ernst Werner, Baron,** physicist and inventor, born in Lenthe, near Hanover, Germany, Dec. 13, 1816; died in Berlin, Dec. 6, 1892. He studied at the Lübeck Gymnasium. Subsequently he took a course in the School of Artillery and studied engineering at Berlin, and in 1837 attained to the rank of lieutenant in the army. Though actively engaged for some time in military duties, he devoted himself with much zeal to the study of practical chemistry and physical sciences, and soon invented a process of electroplating, the electric automatic recording telegraph, and the differential governor. In 1847 he discovered the use of gutta-percha in insulating subterranean conductors of marine cables, and adapted its use to submarine mines for the protection of the harbor at Kiel. In 1848 he supervised the construction of the first telegraph line in Germany, between Berlin and Frankfort-on-the-Main, and soon after laid a subterranean line between Cologne and Berlin.

Siemens left the government service in 1850 to devote himself entirely to scientific studies. Soon after he established manufacturing houses for electrical apparatus in Berlin, with branch offices in Saint Petersburg, Vienna, London, Tiflis, and Chicago. The central establishment at Berlin is noted as the most famous in the world for the application of electricity to industrial art. In 1879 he built and successfully operated an electric street railway in Berlin, which was the first line constructed in the world. Among his many inventions not named above are the dynamo-electric machine, the process of polarizing relays, the electric railway, the Siemens alcohol meter, the pneumatic dispatch-tube system, the methods for testing underground and submarine cables, the Siemens armature, and numerous others. The honors bestowed upon him include the patent of nobility by Frederick III. of Germany and degrees by several universities, including the University of Heidelberg. He contributed to many scientific magazines, among them the *Polytechnic Journal* and *Annals of Physics and Chemistry.* His writings have been published under the title of "Siemens' Collected Writings and Lectures."

SIEMENS, Karl William, eminent inventor and philosopher, brother of Ernst W. Siemens, born in Lenthe, Germany, April 4, 1823; died in London, England, Nov. 19, 1883. He studied at the Lübeck Gymnasium and in Magdeburg and Göttingen. Subsequently he took a course in engineering and electricity in the workshops of Count Stolberg. After becoming interested in various inventions with his brother, he went to England in 1843 to introduce numerous electrical appliances to public use and manage the branch establishment in London. In 1859 he became a British subject and made England his permanent home. His labors were mostly in two distinct fields, the application of electricity and the application of heat. He designed the steamship *Faraday* for cable laying, built electric railroads and made numerous useful inventions Among his most noted inventions are the regenerative furnace, the bathometer for measuring ocean depths, the hydraulic brake for preventing the recoil of artillery on warships, and several for the more successful use of the electric light. The Royal Albert medal was conferred upon him in 1874, the Bessemer medal was granted to him in 1875, and he was knighted in 1883. He published "The Conversion of Heat into Mechanical Effects," "Increase of Electrical Resistance in Conductors with the Rise of Temperature," and "Regenerative Steam Engine."

KARL W. SIEMENS.

SIEMERING (zē'mẹ-rĭng), **Rudolf,** sculptor, born at Königsberg, Germany, in 1835; died in 1905. He studied in his native city and at Berlin. At the latter city he produced the marble statue of King William. In 1877 he completed the monument of Frederick the Great at Marienburg, and subsequently finished the statue of Luther at Eisleben and the war monument at Leipsic. His memorial of Washington at Fairmount Park, Philadelphia, was unveiled in 1897. Other productions embrace the marble statue of Frederick William I., the equestrian statue of William I., and the group in bronze of Saint Gertrude.

SIENA (sē-ā′nȧ), or **Sienna**, a city of Italy, in Tuscany, 58 miles south of Florence. It occupies a site on three hills, has narrow and tortuous streets, and is surrounded by a wall. A railroad line connects it with Florence, Pisa, and other cities. It is surrounded by a fertile country, which produces fruits, cereals, and dairy products. Among the larger structures is a Gothic cathedral dating from the 13th century, which contains fine frescoes of scenes in the life of Pope Pius II. and sculptures by Donatello and other noted artists. Other noteworthy buildings include the university, the Church of San Giovanni, the Oratorio di San Bernardino, the institute of fine arts, the public opera, the municipal library, several Gothic palaces, and a number of convents and secondary schools. Among the manufactures are lime, hats, clothing, olive oil, cotton and woolen fabrics, earthenware, and musical instruments. Though founded by Julius Caesar, it contains no remains of antiquity and appears to have obtained its greatest importance in the Middle Ages, when it had about 200,000 inhabitants. Siena produced a school of artists, which included Guido da Siena, Simone Martini, and Baldassare Perruzzi. Population, 1922, 38,665.

SIENKIEWICZ (shĕn-kyȧ′vĭch), **Henryk**, novelist, born at Wola Orkzejska, Lithuania, in 1846; died Nov. 16, 1916. He attended the gymnasium and later studied philosophy at the university of Warsaw. In 1872 he made his beginning in the field of literature by publishing "Nobody is a Prophet in His Own Country," a humorous story that gained considerable circulation. He visited the United States in company with Madame Modjeska in 1876 and for some time resided in California, where he planned a colony for Polish immigrants. While there he corresponded to the *Polish Gazette*, a periodical at Warsaw, signing the letters *Litwos*. His eminence as an author is based upon "Quo Vadis," which was completed in 1895. This is a historical novel based upon the time of Nero and has been dramatized and translated into the leading languages. Many of his writings deal with Polish history and the cause of Poland, and like Dumas he possessed eminent ability to give a romantic strain and evoke historical personages. He was exiled from Russia in 1905 because of his support of the revolution. Among his chief works are "From the Note-Book of a Posen Teacher," "Deluge," "Without Dogma," "Children of the Soil," "Knights of the Cross," "Pan Michael," "Tartar Bondage," and "The Word."

SIERRA LEONE (sĭ-ĕr′rȧ lē-ō′nē), a colony of Great Britain, on the west coast of Africa. It is situated northwest of Liberia. The colony is separated from the French possessions on the north by the Great Scarcies River and has a coast line of 180 miles on the Atlantic. The total area of Sierra Leone proper, including its newly added dependencies, is about 30,000 square miles. The coast regions are largely lowlands, which portion has a hot and malarial climate, and there is a gradual rise toward the northwest to the vicinity of the Kong Mountains. Among the products are India rubber, coffee, palm oil, copal, cotton, hides, maize, and fruits, all of these being exported. It has recently developed considerable exports of lumber and various minerals. The region was first discovered by the Portuguese under Piedro de Cintra in 1462, who gave it its present name, but efforts to colonize were not made until in 1786, when the English planted a settlement and built a fort. It was made the seat of government of the British settlements on the west coast of Africa in 1866, these including Sierra Leone, Lagos, Gambia, and the Gold Coast.

The government is administered by a resident governor, assisted by executive and legislative councils. Freetown, the capital and principal city, has a population of 30,000. It was long the most important trade center of West Africa and is now the headquarters for the British military forces in West Africa, but its trade has been diminished considerably by the activity of the French in building up their possessions, particularly Senegal. Several lines of railway have been built inland. The government is giving encouragement to schools and a number of secondary institutions. The colony proper has a population of 78,809, including about 45,000 Christians. Sierra Leone Protectorate, organized in 1896, has a population of 998,500.

SIERRA MADRE (mä′drȧ), the name generally applied to the great chain of Cordilleras, or Rocky Mountains, in Mexico. They extend north into Arizona and New Mexico. The slopes toward the east are gradual, but there is an abrupt descent on the Pacific side, thus forming marked precipices and grand scenery. In these mountains are silver mines of much value. They rise to heights approximating about 10,000 feet above sea level.

SIERRA MORENA (mō-rā′nȧ), a mountain chain in Spain, separating Andalusia from New Castile and forming the watershed between the Guadiana and Guadalquivir rivers. The highest peaks rise 5,500 feet above sea level. In these mountains are deposits of lead, quicksilver, lignite, and sandstone. They are mentioned as the scene of several incidents in "Don Quixote."

SIERRA NEVADA (nē-vä′dȧ), a chain of mountains in California, traversing the east central part of that State. It extends from southeast to northwest for 450 miles. The highest peaks are in the southern part, including Mount Whitney, 14,978; Mount Tyndall, 14,386; and Mount Lyell, 13,217 feet. Mount Shasta, in the northern part, is 14,551 feet above sea level. The mountain range has valuable deposits of gold, silver, and other minerals. It is penetrated by many valleys and passes. These include the Tehachapi Pass, in the south; the San Juan Pass, in the central part; and the Truckee Pass, which is traversed by the Southern Pacific Rail-

road to reach the valley of the Sacramento. Extensive forests of deciduous trees abound in the lower slopes and fine coniferous timber is found in the higher sections, extending to a height of 8,000 feet. Among the mountains are numerous valleys of great fertility, especially the Yosemite.

SIERRA NEVADA, an elevated mountain chain of southern Spain, stretching from near Cape Gata westward into Granada. It has the highest peaks of the Iberian Peninsula. Mulahacen, 11,675 feet, is the culminating peak. Its summit is covered with snow perpetually. The scenery is picturesque and there are numerous fertile valleys and deposits of valuable minerals.

SIEYÈS (sē-ā-yās′), **Emmanuel Joseph, Count,** best known as Abbé Sieyès, noted statesman, born in Fréjus, France, May 3, 1748; died in Paris, June 20, 1836. He studied for the church at the University of Paris, obtained an appointment in Bretagne in 1775, and five years later was transferred to the Cathedral of Chartres. Soon after he become chancellor and vicar general of the diocese. Sieyès was extremely liberal in his views on government and issued a number of pamphlets touching on interesting questions involved in the Revolution. In 1791 he was elected to the legislative assembly. He soon acquired marked influence in the national assembly, originating the idea of dividing France into governmental departments, arrondissements, and communes, and in the convention of 1792 recorded a vote for the execution of the king, but refrained from debating the question. In 1799 he suppressed the Jacobin Club and on the return of Bonaparte from Egypt entered into a league with him, from which he resigned because Bonaparte exercised a practical energy that completely outmatched his own. On retiring from public service he was made a count and given an estate valued at $225,000. He was banished from France at the restoration of the Bourbons, but returned after the Revolution of 1830. He wrote a number of works on civics and economics, and drew a new constitution for France.

SIGEL (sē′gĕl), **Franz,** soldier, born in Sinsheim, Germany, Nov. 18, 1824; died Aug. 21, 1902. He graduated at Carlsruhe and entered the service of the Grand Duke of Baden. Subsequently he became involved in the Revolution of 1848 and was compelled to seek safety in the United States, but returned to Germany in 1849 to engage in another insurrection. This enterprise failed also and he fled to Switzerland. In 1851 he went to England and two years later came to the United States. After teaching mathematics in New York City he became professor in a German college in Saint Louis, and at the beginning of the Civil War entered the Union army. He fought with much distinction throughout the war, captured Camp Jackson in Missouri, and took part in the battles of Carthage, Wilson's Creek, Pea Ridge, Cedar Creek, and New Market, and rose to the rank of major general. In 1871 he was made registrar of New York City. President Cleveland appointed him pension agent for New York and he served in that capacity from 1886 to 1889. He was editor for some time of the Baltimore *Wecker,* a German newspaper, and later of the *New York Monthly.* In the meantime he published several works favorable to the establishment of a German republic in Europe.

SIGISMUND (sĭj′ĭs-mŭnd), Emperor of Germany, born Feb. 14, 1368; died Dec. 9, 1437. He was the son of Emperor Charles IV., and married Marie of Anjou, who ascended the throne of Hungary. In 1387 he was crowned King of Hungary and as such led a large army against the Turks, but was defeated at Nicopolis on Sept. 28, 1396. Soon after he conquered Servia, Bosnia, Herzegovina, and several other regions, and in 1411 became Emperor of Germany. The religious excitement occasioned by the Hussites occurred in the early part of his reign and he is remembered for his promise to protect the life of John Huss by a safe bodyguard, but afterwards permitted him to be burned. The Hussites opposed his succession to the throne of Bohemia and were long in open insurrection against him, but he pacified them by granting considerable political independence. Much of his time was spent in defending Hungary against the Turks, defeating them in a decisive battle near Nissa in 1419. Sigismund was avaricious, but possessed a large intelligence and remarkable political sagacity.

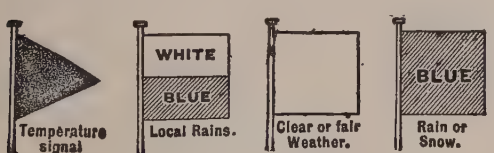
SIGNALS, the means of communicating intelligence by sound or sight. Signals are utilized principally in military operations and for heralding prospective changes in the weather. The first signals used for conveying information to a distance consisted of torches and beacon lights, which served to convey information at night, while flags and other signals were employed in daytime. Ultimately an elaborate system of signals came into general use among the civilized nations in connection with commercial navigation, and in 1857 the international code of signals was devised, which has since gone into general use. In this system are eighteen flags. They are so ingeniously colored and arranged in groups, and there are such well-contrived plans for displaying them, that 78,000 different signals are possible, though only four flags may be used at once. The flags are colored blue, yellow, red, black, and white. The last two mentioned are used chiefly, as they are most easily distinguished at a distance.

Each flag used in the code of signals is designated by a letter. It is suitably colored and designed so that words and terms may be represented. In extremely windy weather figures of wood or iron are drawn up instead of flags, the figures used chiefly being spheres, cones, cubes, and cylinders. Signal books, containing a full exhibit of all the signals and their meaning, are published in the different languages of the nations making use of them, thus supplying a very

practical system for ships in international trade and communication. Electric lights displayed in different colors are used for long distances at night, while five fireballs are shot into the air for short range, green and red being the common colors. It is necessary to signal vessels in fogs and snowstorms, when whistles or horns are blown or bells are rung.

Signals of various kinds are employed in the army and navy, thus facilitating communication between different parts of the army and between warships. Plans of this kind were employed from remote antiquity among the Greeks, Romans, and Phoenicians, and throughout the Middle Ages. The value of a systematic use of signals was recognized in America in colonial times, and signal systems have since been put in a very efficient condition. Congress authorized the purchase and equipment of signal apparatus in 1860, and after the beginning of the Civil War schools were instituted to instruct those who were to accompany the army in the field. Albert J. Myer originated a system of signals of much value. He was given the supervision of field signaling, with the rank of major. Congress provided for reorganizing the signal service in 1866 and in 1870 added a meteorological division, but in 1891 the Weather Bureau was transferred to the Department of Agriculture. The government maintains a school of instruction in military signaling at Fort Riley, Kansas, where instruction is given in photography, electricity, and topography, as well as in the practical use of flags, telephones, lanterns, searchlights, rockets, the heliograph, and other apparatus.

Weather signaling is carried on by the Weather Bureau, which is under the Department of Agriculture. The central station at Washington receives telegraphic communication from all parts of the country three times a day, and from these forecasts for the next 24 hours are made and sent to all sections. Signal flags are displayed in thousands of cities and towns as soon as forecasts are received from Washington, or some other distributing center. In the accompanying illustration are shown the flags used to indicate



WEATHER SIGNALS.

the forecasts of weather and temperature. It will be observed that a black triangular flag serves as a temperature signal; a white-blue flag, local showers; a blue flag, rain or snow; and a white flag, clear or fair weather. To indicate the approach of higher temperature, the black triangular flag is displayed over the weather flag, while a lower temperature is predicted by placing it below the weather flag. Warning of a cold wave is signaled by displaying a white flag with a black center. The press furnishes valuable means for warning the public, and through it the reports become generally circulated by means of the daily newspapers. Similar systems are maintained in all the leading countries, which, in many instances, communicate with each other.

SIGNAL SERVICE, the branch of the public service of any country as a means to transmit intelligence by signals, especially in the army and navy. Experienced signalists consider that signaling at five miles is at a short range. A rod twelve feet long is sufficient to transmit messages by signals a distance of ten miles. In the military service it is possible, by means of a well-understood code, to communicate with an army at a distance of 25 miles. The invention of serviceable balloons has greatly extended the usefulness of signals, and these means have been greatly added to by the use of electric lights and wireless telegraphy. It is well understood that the signal corps plays an important part in a battle, especially if the line of action extends over a distance of 80 to 100 miles. The British signal service is under the jurisdiction of the Royal Engineers Telegraph Corps, which consists of about 250 men and officers. In the United States the Signal Corps consists of 800 men. They are supplied with flags, balloons, signal lights, and various instruments, such as the telephone, heliograph, and the telegraph. More recently wireless telegraph apparatus has been added to the equipment. A school of instruction in signals is maintained at Fort Riley, Kansas.

SIGN LANGUAGE. See **Deaf-mutes.**

SIGNORELLI (sē-nyō-rĕl'lē), **Luca,** painter, born at Crotona, Italy, about 1471; died in 1523. He studied painting under Piero della Francesca at Arezzo and spent much of his life in the hills of Tuscany. In 1475 he went to Rome, where he painted two frescoes representing events in the history of Moses. Soon after he completed an altarpiece for the cathedral in Perugia. The later years of his life were spent at Cortola, where he lived in luxury and splendor. Many of his productions are in the leading galleries of Europe, including those of Uffizi and Berlin. Among his masterpieces are "The Resurrection," "The Last Supper," "The End of the World," "History of Antichrist," and "Life of Saint Benedict."

SIGOURNEY (sĭg'ĕr-nĭ), **Lydia Huntley,** authoress, daughter of Ezekiel Huntley, born in Norwich, Conn., Sept. 1, 1791; died in Hartford, June 10, 1865. She studied at Norwich and Hartford, taught women's classes in the latter city for five years, and in 1819 married Charles Sigourney. Her first writings appeared in 1815, when she published "Moral Pieces in Prose and Verse" and made numerous contributions to various periodicals. Her leisure hours after marriage were devoted to literature, publishing many interesting poetic and prose writings. She contributed to about 300 different periodicals in the course of her literary life. In 1841 she visited

Europe and the following year published a record of the tour under the title of "Pleasant Memories of Pleasant Lands." Some of her books were widely circulated, both in America and Europe. She is often spoken of as the "American Hemans," owing to the varied and extensive use of her pen. Among her writings are "Letters to Young Ladies," "Water Drops," "Voice of Flowers," "Daily Counsellor," "Traits of the Aborigines of America," "Man of Uz, and Other Poems," and "Letters of Life."

SIGSBEE (sĭgz'bĭ), **Charles Dwight,** naval officer, born at Albany, N. Y., Jan. 16, 1845. He studied at the Annapolis Naval Academy, where he graduated in 1863 and was assigned for service to the Gulf Squadron. In 1864 he took part in the Battle of Mobile Bay and the following year was assigned to the North Atlantic Squadron, with which he participated in the capture of Fort Fisher. He was placed in command of the battleship *Maine* in 1897, which was destroyed in the harbor of Havana on Feb. 15, 1898. During the war against Spain he commanded the battleship *Texas,* and became chief officer of naval intelligence in 1900. He was promoted to the rank of rear admiral in 1904. Several decorations were awarded to him, including that of the Red Eagle of Prussia by Emperor William I. He published "Personal Narrative of the Battleship Maine." He died July 19, 1923.

SIGURD (sē'gụrd), the hero of the *Volsung Edda,* corresponding to the Siegfried of the German *Nibelungenlied.* In northern mythology he is described as the son of Sigmund, who descended from Odin. It is said that he grew to manhood at the court of his stepfather and that he was given the sword of his father, who received it as a gracious gift from Odin. See **Nibelungenlied.**

SIKHS (sēks), meaning disciples, the name of a religious sect of northwestern India, whose tenets include the worship of one invisible God. It was founded by Nanak Shah (1469-1539 A.D.), who conceived the laudable plan of unifying all the Hindu castes. His preaching favored universal toleration, encouraged acts of benevolence and self-denial, and advocated equal social and political rights to all men. The Sikh state was founded by Guru Govind, the tenth teacher after Nanak Shah, who made his followers a military power, chiefly to defend the faith against persecutions by the Mohammedans and other religious classes. His adherents were allowed to wear long hair and beards. They had equal recognition in all social and political affairs, and their diet was left largely to the individual taste of each. This teacher compiled the sayings of Nanak and his immediate successors in the two works entitled *Adi Granth* and *Dasema Padshah,* which he intended should supersede the *Puranas* and the *Vedas.*

The Punjab became the seat of their influence, which they freed from the Mohammedan government in 1792, and Runjeet Singh was made the ruler of the Sikhs, assuming the title of Maharajah. Multan and other regions were annexed and the territory under Sikh control included about 70,000 square miles, but after the death of Runjeet the Sikh empire came into collision with the British government of India, and the Sikhs were successively defeated in decisive battles in 1845-46. A rebellion occurred in 1848, but they were finally conquered the following year and their possessions were annexed to British India. They supported the British in the mutinies of 1857, chiefly from fear that a Mohammedan empire might be restored. The Sikhs number about 1,875,000 at present, thus forming much the larger part of the inhabitants of the Punjab. They are mainly of Jat origin and engage chiefly in agricultural pursuits.

SI-KIANG (sē'kyäng), a river in the southwestern part of China. It has its source in the province of Yun-nan, has a tortuous course toward the southeast, and, after flowing about 985 miles, discharges into the China Sea near Canton. Several important rivers flow into it, including the Yü-kiang, and it has been improved for navigation by a network of canals. It has an estuary about 75 miles wide and is navigable for some distance by the largest vessels, but extensive rapids obstruct the upper course.

SILAGE (sī'lâj). See **Ensilage.**

SILENUS (sī-lē'nŭs), in classical mythology, the son of Hermes or Pan and the companion of Dionysus. Originally he was the god of flowing water, but later came to be regarded a jovial man with a bald head and a tendency to become intoxicated. It is said that he despised the gifts of fortune and preferred to practice the arts of wisdom. A temple at Elis was dedicated to him.

SILESIA (sĭ-lē'shĭ-ä), in German *Schlesien,* a German province of Europe, now belonging to Germany and Poland. It has a total area of 17,554 square miles, of which 15,566 square miles belong to Germany and 1,988 square miles to Poland. The former is a province in southeastern Prussia, lying south of Posen and Brandenburg, and is divided by the Oder River. The soil is exceedingly fertile and there is an abundance of timber and pasturage. It has deposits of various minerals, including coal, sulphur, lead, copper, iron, and silver. In several sections are mineral springs. Among the soil products are chicory, beet roots, flax, hops, hay, corn, tobacco, wheat, and fruits. The manufactures embrace leather, wine, hardware, glass, sugar, machinery, cotton textiles, woolens, linen and silk goods, and clothing. Breslau is the capital and principal city. The total population of the province in 1910 was 5,226,311. Austrian Silesia is quite mountainous. It has valuable mineral deposits, extensive forests, and manufactures of textiles, machinery, and lumber products. The population in 1920 was 756,590.

Silesia was occupied by German tribes at the

beginning of the Christian era. They moved westward in the 6th century and the region became populated with Slavonians. After belonging to Moravia and Bohemia, it became part of Poland in the 10th century. In the 14th century it was divided into a number of small states that were annexed to Austria in 1526. Frederick II. of Prussia laid claim to it in 1740 by virtue of an agreement made by the Duke of Liegnitz in 1537, to the effect that the Elector of Brandenburg should secure sovereignty over it in case the former left no direct heir. Three destructive wars between Prussia and Austria followed. The first occurred in 1740-42, the second in 1744-45, and the third in 1756-63. The last mentioned is generally termed the Seven Years' War (q. v.).

SILICA (sĭl'ĭ-kȧ), a compound formed of oxygen and silicon. The latter is an abundant nonmetallic element and enters into the composition of many rocks. Silica is one of the most widely distributed materials, occurring either in amorphous masses or in a crystallized form. It forms a constituent part of rocks and enters largely as a productive element into many soils, serving as an important food for various plants. Though not soluble in pure water, it is held in solution by water, and enters into the structure of animal and vegetable tissues. It is known as *rock crystal,* when it is in a native crystalline state, and as *amethyst,* when its crystals are of a delicate purple color. Silica occurs in the form of carnelian and chalcedony and as a constituent of opal, mica, agate, feldspar, serpentine, and hornblende. In various forms it is valuable as a stone and enters into the manufacture of porcelain, glass, and a number of hydrates which yield salts known as *silicates.*

SILICON (sĭl'ĭ-kŭn), or **Silicium,** a nonmetallic element, the most abundant one, next to oxygen, that abounds in the crust of the earth. It is insoluble in water, but dissolves readily in hydrofluoric acid or a warm solution of potash. Powdered silicon is a nonconductor of electricity. When heated in air or oxygen, it burns brightly and with such intense heat as to fuse the external crust of silica. It is obtained in a dull brown powder by passing the vapor of chloride of silicon over heated potassium contained in a glass tube, or from the aqueous solution of the gaseous fluoride of silicon.

SILK, a delicate fibrous substance produced by many insects, but especially by the larvae of silkworms to form their cocoons. The silk of commerce is obtained chiefly from the common silkworm (q. v.). To obtain the silk, the cocoon is taken from the twig to which it is fastened before the moth commences to eat its way out, and is placed in warm water. This not only kills the moth, but also softens the gum that holds together the threads of silk. The silk is spun backward and forward to cover the whole cocoon, not wound around it like thread on a spool, and after being soaked can be easily loosened and placed on a reel. The vat containing the hot water usually has four parts, in each of which a quantity of cocoons is placed, and from each part one thread is taken, thus joining the ends of four different threads. Connected in this way, they are drawn through guides to large reels moved by machinery and wound as one thread. When one of the filaments has been taken from a cocoon, another is put in its place, thus forming a continuous thread. The silk on the outside of the cocoon, called *floss silk,* is of poor quality, but when about one-half is unwound the thickness decreases fully 50 per cent. and the silk assumes the finest quality. Much of the gummy matter is taken off when put on the reeling machine, but the part still remaining is afterward removed, and the threads are wound on bobbins.

Silk is ready for the weaver when it has undergone a process called *throwing.* This involves unwinding it from the bobbins, twisting it in a machine, and preparing threads for spinning and weaving. The process depends largely upon the articles to be manufactured, for which purpose the silk is carefully selected and the threads are variously made. Singles are used in weaving plain silk and ribbons, and double-twisted is employed in making warps. Raw silk obtained from the cocoon is of a bright yellow color, but it is variously dyed in the process of manufacture. Formerly the waste materials accompanying the unwinding of the cocoons and the twisting of the threads were considered useless, but a process was discovered in 1857 by which the outer silk of the cocoons, defective cocoons, and ordinary waste resulting from handling may be utilized profitably. Silk weaving from the prepared thread is a process quite similar to the weaving of woolen and cotton fabrics.

It is thought that the manufacture of silk fabrics originated in China, whence it was introduced into Europe and finally brought to America. The wife of a Chinese emperor is credited with unwinding the first cocoon in 2600 B. C., and for centuries the industry was guarded carefully lest other countries should enter into competition. Several Persian monks are said to have carried the eggs of silkworms from China to Constantinople in a hollow cane about 530 A. D., and soon after marked interest was given to silk culture in Southern Europe. Spreading rapidly from Constantinople into Greece, Sicily, Italy, Spain, and France, it has continued to form an important industry in Southern Europe until the present. Little progress was made in Great Britain until in 1685, when the Edict of Nantes caused many silk weavers to leave France and seek refuge in England. An effort to introduce silk culture into the American colonies was made by James I., who sent eggs to Virginia and offered rewards for the production of raw silk. However, tobacco proved more profitable and little progress was made until about the middle of the last century, when several associations were formed to promote silk culture in New Jersey, the Carolinas, Florida, California, and other

states. Large quantities of raw silk have been imported into the United States for many years, which, aided by home production, have greatly stimulated domestic manufactures. In 1860 only 13 per cent. of the silk used in the United States was of American manufacture, but in 1880 it reached 30 per cent.; in 1890, 55 per cent.; in 1900, 85 per cent.; 1920, 87 per cent.

The importations of silk goods into Canada and the United States are now chiefly fine products. They come principally from the hand looms of Crefeld, Zurich, and Lyons. China alone produces about one-half the raw silk of the world, and Japan and Italy take the next rank. Considerable quantities are manufactured in France, Germany, Austria, Turkey, Greece, Spain, India, and Persia. It is estimated that about one-third of all the raw silk produced in the world is handled in the mills of the United States, the largest importations being from China, Italy, Austria, France, India, and Japan. At present there are about 650 silk factories in that country, most of which are in New Jersey, New York, and Pennsylvania. They produce products annually that have a value of $765,526,500. The annual importations of raw silk are valued at $350,939,485 and the amount annually consumed is correspondingly large. The present rate of progress in sericulture gives reasonable assurance that the United States will within a comparatively short time produce the greater portion of raw silk consumed in its factories.

SILK, Artificial, a product which resembles pure silk, now called *rayon* and used extensively as a textile. It is made chiefly of cellulose prepared from cotton and the pulp of soft woods. The cotton is carefully carded into wadding before being treated with a mixture of nitric acid and sulphuric acid, in the proportion of 15 parts of the former to 85 parts of the latter. By this process the cotton is converted into nitrocellulose of a clear blue color, after which it is pressed and carefully washed, and is then formed into collodion by dissolving in a preparation of ether and alcohol. After standing in this form for several weeks, it is run between steel rollers and forced through minute tubes into greatly diluted nitric acid, which causes the streams of collodion to be converted into fibers. The fibers are then reeled, are dried by warm air, and are subjected to several washing and drying processes, after which the threads are ready to be spun and dyed like pure silk. This product, though elastic and lustrous like natural silk, is less durable. It can be produced at about one-third the cost of real silk.

SILKWORM, the larva of a moth that produces a dense silken cocoon of value commercially. The silkworm cultivated almost universally came from northern China, being a moth of the family *Bombycidae,* but there are about 400 species, though some are not valuable in silk culture. The body of the silkworm is thick and hairy. In a mature state it is about an inch long and has stout legs, and the large wings are marked with dark lines. The body of the female is larger than that of the male, and both die soon after the female deposits its eggs. These are about the size of a mustard seed and are fastened to the leaf of a mulberry tree, or some other object, by a gummy substance. The eggs may be kept a long time in a dry, cool place. They

SILKWORM.
1 Male Moth; 2, Female Moth; 3, 3, Silkworms; 4, Chrysalis; 5, Cocoon.

hatch soon after coming into a warm place, and the young insects feed with remarkable greed on the leaves of the mulberry tree. They remain in the caterpillar state from six to eight weeks, in which time the skin changes four times, and the body finally assumes an ashy color and a length of nearly three inches. In the body are twelve segments, six anterior or forelegs, ten fleshy legs in the hind part of the body, and a large mouth.

The young insects stop eating about the fifth week and find a suitable place to spin their cocoons, which they prepare from silk threads

(Opp. 2636)

SILKWORM.

1, Mulberry branch; 2, Moth laying eggs; 3, Second-molt worm; 4, Fourth-molt worm; 5, Full grown worm; 6, Male moth; 7, Female moth; 8, Open double cocoon; 9, Moth emerging from cocoon; 10, Cocoon; 11 Pupa in cocoon; 12, Raw manufactured silk; 13, Manufactured silk.

produced by their own bodies. These threads are made from a glutinous substance secreted by two tubular glands near the mouth, one on each side of the body, the gum being drawn through a single tube at the upper lid and spun into silk. In this way the thread of silk is made to consist of two strands and varies in length from 250 to 300 yards. From three to five days are required to complete the cocoon, and after finishing it the insect assumes a waxy-white color and soon forms the second stage of life, or the pupa state. In this pupa or chrysalis stage it remains about three weeks, when it emerges as the imago, or perfect moth. Insects designed to supply silk material are not allowed to develop into the perfect moth, but are thrown into warm water and killed, while the silken threads are unwound and used in the manufacture of thread and fabrics. The moth produces from 300 to 500 eggs. One ounce of eggs produces 100 pounds of cocoons, while twelve pounds of cocoons yield one pound of raw silk. Among the conditions necessary for successful silk culture are pure air, warmth, and suitable food. Thrifty mulberry trees are essential, the most valuable being a species of the white mulberry. The annual production of raw silk in the world is estimated at 85,500,000 pounds. See **Silk.**

SILKWORM GUT, a material prepared from the viscid secretion found in the body of a young silkworm, immediately before it begins to spin the cocoon. The insect is submerged in vinegar for several hours, and the substance is then extracted from the dead body. By soaking in a caustic solution the thread becomes loosened and may be removed easily. It is used for the manufacture of *gut,* which is employed extensively in making lines for anglers.

SILLIMAN (sĭl'lĭ-măn), **Benjamin,** author and physicist, born in Trumbull, Conn., Aug. 8, 1779; died Nov. 24, 1864. He graduated from Yale University in 1796 and was admitted to the bar in 1802. Soon after he became professor of chemistry at Yale University, a chair held by him for many years. Besides taking advanced work in Philadelphia, he visited Great Britain, Holland, and other European countries to pursue study in physical sciences. In 1807 he took part in a geological survey of Connecticut, observed the fall of meteors, and invented a compound blowpipe. *The American Journal of Science and Arts* was founded by him in 1818. He contributed articles on scientific subjects to other periodicals and many works of reference. In 1851 he made a second extensive visit to Europe, of which he published an account under the title "Visit to Europe," and in 1855 lectured for the last time at Yale. Besides publishing a number of text-books on scientific subjects, he edited an edition of *Bakewell's Geology.* He was succeeded as a lecturer in Yale University by his son, Benjamin Silliman. The latter was born in New Haven, Conn., Dec. 4, 1816; died there June 14, 1885. He graduated from Yale University in 1837 and was professor in that institution from 1854 to 1885. He published "First Principles of Chemistry," "Progress of Science and Mechanism," and "American Contributions to Chemistry."

SILURIAN SYSTEM (sĭ-lū'rĭ-ăn), a division of the rocks of the Paleozoic group, preceded by the Cambrian and followed by the Devonian systems. It is so named from the Silures, a people of ancient Britain, the name being first applied by Murchison. Two more or less clearly defined formations make up the division, known as the Lower Silurian and the Upper Silurian, but the former of these is usually designated as Ordovician by English geologists. Silurian rocks are found in all the continents. They are especially abundant in the eastern part of North America, extending from Quebec southward through New York, Maryland, and Tennessee. They are especially prominent at Niagara Falls, at the Delaware Water Gap, and in the Kittatinny Mountains. Other deposits occur in Georgia, Nevada, and the Black Hills. Although fossils of seaweeds are abundant, the land plants are not well represented. Invertebrate animals were very numerous and of large size during the time these rocks were formed. Many minerals occur within the deposits, such as rock salt, gypsum, and hematite iron ore.

SILVER, a precious metal. It is found in the native state and in combination with many other elements, among them gold, sulphur, arsenic, antimony, chlorine, lead, and copper. Early writings make it certain that silver was known to the ancients as early as gold. This is due probably to the circumstance that silver is often associated in a natural state with gold, and that both may be fused at an ordinary heat. Pure silver is the most brilliantly white metal and is exceeding malleable and ductile. It is softer than copper, but is harder than gold, and takes a fine polish. Silver may be beaten into sheets of only one-hundred-thousandth of an inch in thickness, and drawn out into a wire finer than a human hair. As a conductor of heat and electricity it excels all other metals. It has a specific gravity of 7.14 and a density of 10.5. The melting point is about 1,832° Fahr.

Silver does not tarnish on being exposed to the air, thus forming an important metal for plating articles and in the manufacture of jewelry and tableware. It is employed extensively in coinage and glass staining, in making compounds useful in photography, and in forming many alloys. When the silver ores do not contain lead, the silver is extracted by amalgamating it with mercury and driving off the latter by the action of the heat. Several complicated processes are utilized in extracting silver. In all of them the silver is first converted into silver chloride, and the metal is set free from the chlorine by amalgamation. When the silver ores contain lead, it is extracted by smelting. This method is

based on the affinity that silver has for lead; the latter, acting as a solvent, serves to extract the silver from baser metals united with it. Later the silver is separated from the lead by cupellation, the silver remaining intact while the lead is formed into an oxide.

Silver was secured almost entirely from regions producing it in the native state, or nearly pure, up to about the middle of the 19th century, but since then newer discoveries of silver in combination with other minerals have led to the adoption of methods of mining and extracting that resulted in utilizing the silver ores of much lower grade than were formerly thought to be of utility. The world's supply of silver was secured chiefly from Mexico and South America prior to that time, but since then Canada and the United States have become important in the production of silver. Germany is the largest silver-producing country of Europe. Its mines have taken high rank since 1623, and large bulks of native silver have been secured from its deposits. Considerable quantities of silver are obtained in Bohemia, Norway, Spain, and Hungary, but the most important mines in the world are those of North and South America.

A silver mine in Nevada, known as the Comstock Lode, is one of the first great silver mines of the United States and ranks as one of the most valuable. Since its discovery, other vast veins and deposits of silver have been found, including those at Leadville, Colo.; the Coeur d'Alene, Idaho; Granite Mountain, Mont.; Eureka, Nev.; and Kingston, N. M. Besides these are many other noteworthy deposits and mines, all containing more or less gold, iron, sulphur, and other elements in connection with the silver. The rank taken by the leading silver-producing states is usually in the following order: Utah, Montana, Nevada, Idaho, Arizona, California, Colorado, New Mexico, Texas, Washington, Michigan, and Missouri. Canada is now one of the leading silver-producing countries, the most extensive mines being in Ontario and British Columbia.

Mexico has first rank in the production of silver, producing more than any other country in the world. The most important mines are in the state of Zacatecas, which have been worked about 200 years. Large masses of silver are secured in the Andean countries of South America, particularly Peru, and in New South Wales and other provinces of Australia. The world's output varies greatly in value, owing to the fluctuations in the price of silver. Australasia produces almost 14,500,000 ounces per year. In 1915 the total value was $130,360,980, which is about the annual average. In that year the world's output was 198,399,288 ounces. The eight leading silver-producing countries were:

	OUNCES.		OUNCES.
United States	73,505.000	Bolivia	5,892.500
Mexico	90.680.000	Central America	2,901.250
Canada	17,000,500	Spain	2,876.076
Peru	18,500,800	Japan	3,208,690

SIMCOE (sĭm'kō), a lake of Canada, in Ontario, situated between Georgian Bay and Lake Ontario. It is 30 miles long and 18 miles wide. The surface is 128 feet above Lake Huron, into which it discharges through the Severn River and Georgian Bay. The area is 160 square miles. Within the lake are many islands, and fine forests occur in the vicinity. Fishing and boating are good. In the winter it freezes over so firmly that it can be crossed with teams.

SIMCOE, John Graves, soldier, born at Cotterstock, England, Feb. 25, 1752; died Oct. 26, 1806. He studied at Merton College, Oxford, and came to New England at the time of the Revolutionary War. In the battles of Brandywine and Monmouth he was wounded. He surrendered with Cornwallis at Yorktown in 1781. He was made the first Governor of Upper Canada in 1791, in which office he did much to extend the influence of the Loyalists who emigrated from the United States. In 1796 he became Governor of Santo Domingo, was promoted to the rank of a lieutenant general in 1798, and received the appointment of commander in chief of India in 1806, but illness prevented him from going to Asia. Lake Simcoe and several localities in Ontario were named in his honor.

SIMILE (sĭm'ĭ-lē), a figure of speech, consisting of a word or phrase by which anything is likened to something else, in one or more of its aspects. The comparison in a simile is pointed out by certain words, such as *like* or *as*. Similes please because we are disposed to compare objects with one another, and statements are embellished and impressed more forcibly on the mind. They should not be drawn from things which have too near an obvious resemblance to the object compared, nor from objects which present a likeness too faint and remote. Metaphor resembles a simile, but differs from it in that we directly substitute the action or operation of one object for that of another. The sentence, "He is the pillar of the state," is a metaphor; while, "He upholds the state, like the pillar which upholds an edifice," is a simile.

SIMMS (sĭmz), **William Gilmore,** poet and novelist, born in Charleston, S. C., April 17, 1806; died there June 11, 1870. He was of Scotch-Irish descent and began to write verses at the age of eight years. After clerking in a drug store, he studied law and became a member of the Charleston bar in 1827, but soon devoted his entire time to journalism and literature. He was connected with the *City Gazette* in 1828, in which he published a number of editorials against the doctrine of nullification. Many of his novels have their plot in the American Revolutionary period, and he collected and published numerous historical and pioneer incidents. His best known writings embrace "Lyrical and Other Poems," "Tricolor, or Three Days of Blood in Paris," "Damsel of Darien," "Southern Passages and Pictures," "South Carolina in the Revolu-

tion," "Atalantis, a Tale of the Sea," and "The Vision of Cortez." The University of Alabama conferred the law degree upon him. He was for some years a member of the State Legislature. In 1846 he was defeated by one vote for lieutenant governor of South Carolina.

SIMON (sē-môn'), **Jules François,** statesman and economist, born in Lorient, France, Dec. 31, 1814; died in Paris, June 8, 1896. He studied successfully in his native city and at Vannes, and then took a course of instruction at the Sorbonne in Paris under Victor Cousin. He succeeded the latter as lecturer at the Sorbonne in 1839, when he became noted as an instructor and writer on philosophic and economic questions. Shortly after the Revolution of 1848 he was made a member of the chamber of deputies, but refused to take the oath of allegiance to the empire on the accession of Napoleon III. His eminent scholarship and ability made him a leader of the republicans, and after the establishment of the present republic he became minister of public instruction. In 1875 he was elected a member of the French Academy and was made senator for life. The following year he was chosen prime minister, but resigned in 1878 on account of his advanced views in relation to the freedom of the press. He became permanent secretary of the Academy of Moral and Political Science in 1882, and in 1890 took part in the labor conference in Berlin, where he was presented with a collection of the musical works of Frederick the Great by the emperor. His writings include "Natural Religion," "Government of Thiers," "Liberty of Conscience," and "Liberty." He edited the works of Descartes, Bossuet, Arnauld, and Malebranche.

SIMON MAGUS (sī'mọn mā'gŭs), meaning Simon the Magician, an individual mentioned in the *Acts of the Apostles.* It appears that he flourished in Samaria about 37 A. D., where he was a person of considerable prominence and influence. At the time Philip the Evangelist came to Samaria, many of his followers were converted, and Simon Magus also consented to be baptized. When Peter and John came to Samaria to impart the Holy Ghost to the baptized by the laying on of hands, Simon was greatly astonished and offered the apostles money to invest him with a like power in conferring the gift. For this he was thoroughly rebuked by Peter, who exhorted him to repent and seek forgiveness from God.

Justin Martyr gives a much fuller account of Simon than is found in the *Acts of the Apostles.* He states that Simon was born in Gittha, in Samaria, and that he came to Rome in the reign of Claudius. While there he gained some followers by exercising magical arts. It appears that a statue was erected to his memory in Rome, where he was not only identified with the teachings of Christ, but entered into connection with the legends of Greek origin and the worship of Zeus. Many of the stories connected with him are of uncertain origin, but it is quite well established that he introduced a system of religious worship ranging between Greek and Christian worship, which long held a place among a limited number of followers. It was commonly known as Simonianism.

SIMOOM (sĭ-mōōm'), or **Simoon,** a name of Arabic origin, applied to the hot, suffocating winds that frequently occur in the desert regions of Africa and Western Asia. These winds are caused by ascending currents of air due to the extreme heat over the sandy surface and to the influx of colder air from all sides, thus forming movements of air similar to a cyclone. In many regions of Arabia and Africa the surface becomes heated to 200° Fahr., thus giving it a peculiar dryness. The winds resulting from this greatly diversified temperature bear with them intense heat, choking dust, and even coarse gravel. They often prove destructive to animal life and vegetable forms. In some regions vast mounds of sand are transported and, when coming in contact with a storm of this kind, many persons accompanying caravans lose their lives. It is supposed that a simoom overtook the army of Cambyses, when crossing the desert to secure the riches from the temple of Jupiter Ammon, and that he and 50,000 of his troops perished. Simooms are most common in the spring and summer. They are greatly modified by the character of the surface of the region over which they pass. When of vast extent, they remarkably affect the movement of the air in neighboring regions.

SIMPLON (sĭm'plŏn), a pass in the Alps of Switzerland, near the boundary between Valais and Piedmont, Italy. The highest point is 6,592 feet above sea level. It was made famous by Napoleon I., who constructed a military road through it in 1800-06. This road was 42 miles long by 30 feet wide and contained several tunnels and 610 bridges. In 1898 the Simplon Tunnel was commenced between Brig and Isella, and was fully completed for use in 1905. It is about 12 miles long and has two passageways, each containing a single railway track. This tunnel surpasses the Saint Gotthard by about two miles and is the longest railroad tunnel now in use.

SIMPSON (sĭmp'sŭn), **Sir James Young,** eminent physician, born in Bathgate, Scotland, June 7, 1811; died May 6, 1870. He studied at the University of Edinburgh, where he was generally admired for industry and successful study, and after graduating, in 1832, became a professional assistant to one of the professors. In 1840 he was made a full professor at the university, and by indefatigable labors greatly extended the reputation of that institution. He read an exhaustive paper on the use of chloroform as an anaesthetic in 1847, which was instrumental in causing the general adoption of chloroform in medical practice. Among the honors

bestowed upon him are the gold medal of the French Academy, in 1856, and honorable recognition by many scientific societies of Europe and America. He was made a baronet in 1866, and a statue was erected to his memory in 1877. His chief writings are "Clinical Lectures on the Diseases of Women," "Selected Obstetrical Works," and "Anaesthesia and Hospitalism."

SIMPSON, Jeremiah, statesman, born in New Brunswick, Canada, in 1842; died Oct. 23, 1905. He was brought to Oneida County, N. Y., at the age of six years, where he attended the public schools. When a youth he took up the life of a mariner, and by diligent application rose to the captaincy of vessels on the Great Lakes. In 1878 he removed to Kansas, where he became influential as a leader in the Populist party. He served two terms as a member of Congress, in which he took a prominent part as a debator. The name *Sockless Simpson* was applied to him, owing to the circumstance that he avowed to go barefooted if a certain measure failed to pass.

SIMPSON, Matthew, Methodist Episcopal bishop, born in Cadiz, Ohio, June 20, 1811; died in Philadelphia, Pa., June 18, 1884. He was educated in the Pennsylvania Madison College and afterward studied medicine, but subsequently entered the ministry of the Methodist Episcopal Church. In 1837 he was made professor of natural history at Allegheny College. Two years later he became president of the Indiana Asbury University, now De Pauw University, and in 1852 was made a bishop. He went abroad to travel in Eurasia in 1857, and, on returning, in 185., became president of the Garrett Biblical Institute, Illinois. In 1870 and 875 he made visits to Europe and served as a delegate to the Methodist Ecumenical Council in Europe, in 1881. Simpson was noted as an able pulpit orator and lecturer. He was held in high esteem by President Lincoln and officiated at his funeral. He published a number of works, among them "Cyclopedia of Methodism" and "One Hundred Years of Methodism."

SIMS (sĭmz), **George Robert,** author born in London, England, Sept. 2, 1847; died Sept. 5, 1922. He studied at the University of Bonn, Germany, and engaged as journalist. In 1874 he began writing sketches for the *Dispatch,* contributing "Three Brass Balls," "Social Kaleidoscope," and "Theater of Life." Subsequently he was engaged on the London *Daily Times,* for which he wrote much on the condition of the poor and drew graphic descriptions of the darker sides of London life. His chief writings include "Ballads of Babylon," "How the Poor Live," "Stories in Black and White," "Ballads and Poems," "Crutch and Toothpick," "Two Little Vagabonds," "A Scarlet Sin," "In Gay Piccadilly," and "In the Ranks." He edited, in 1902, "Living London."

SIMS, James Marion, surgeon, born in Lancaster County, South Carolina, Jan. 25, 1813; died in New York City, Nov. 13, 1883. After graduating at the South Carolina College, in 1832, he studied medicine in Charleston and Philadelphia, and subsequently entered upon a successful practice at Montgomery, Ala. While there he introduced new operations and instruments in the medical practice, and was especially successful in treating clubfeet, lockjaw in infants, and strabismus. He was president of the American Medical Association. Among his published works are "Clinical Notes on Uterine Surgery" and "Silver Sutures in Surgery."

SIMS, William Snowden, naval officer, born in Port Hope, Canada, Oct. 15, 1858. He studied at Annapolis, where he graduated in 1880, and entered the naval service of the United States. For three years, beginning in 1887, he was naval attaché at Paris and St. Petersburg, and in 1909 was inspector of target practice in the Bureau of Navigation. He commanded the Minnesota in 1909-1911, was made commander of the Atlantic torpedo flotilla in 1913, and in 1917 was put in command of the United States naval forces in Europe, with the rank of vice-admiral

SINAI (sī'nā), **a mountain region of northwestern Arabia.** It occupies a peninsula in the Red Sea, its western shore being washed by the Gulf of Suez and its eastern by the Gulf of Akabah. The highest peak rises 8,552 feet above sea level, but there are three general groups, all of which cover a region that extends about seventy miles from north to south. These mountains are formed of granite, sandstone, and limestone, and in many places are extensive caves with inscriptions dating from various periods in history. The whole region has a peculiarly desolate appearance when viewed from the higher altitudes, but in some places are valleys containing fine pasture lands and palms and other trees. The inhabitants are principally Arabs, who lead a nomadic life and engage chiefly in rearing goats and sheep and cultivating fruit and vegetables. In the eastern part is Mount Jebel Katherine, height 8,160 feet. It towers considerably above the surrounding mountains in two peaks, the southern being known as the Mountain of Moses and the northern, as Mount Horeb. It is thought that the former peak is the one on which Moses received the Ten Commandments and the other laws by which the Israelites were bound to the obedience of God and the observance of rites. The Church of Saint Katherine was founded at its foot by Emperor Justinian about 527, and besides it there are several other chapels and churches at which pilgrims worship.

SINDH (sĭnd), or **Sind,** a province in the western part of British India, adjoining Baluchistan, forming part of the Bombay Presidency. It has an area of 47,066 square miles. Agriculture is carried on almost entirely by means of irrigation, the water being secured by means of canals connected with the Indus River. In most places the soil is sandy and impregnated

with alkali, but the delta of the Indus is sufficiently watered and highly fertile. The inhabitants consist largely of Baluchis and Juts, a race of Hindus, and settlements of Afghans are maintained in the northwest. Karachi is the capital. Population, 1923, 3,612,238.

SINDIA, or **Scindia,** the name of a ruling family of India, constituting a powerful line of Mahratta princes. The rulers of this line descended from Ranoji Sindia, a native of low caste, who rose to a high rank and received as a fief half of the province of Malwa in 1743. He died in 1754 and was succeeded by his son, Madhoji Sindia, who became the virtual ruler of India. His army was disciplined by Frenchmen and he captured Gwalior, Delhi, and Agra. He was succeeded by a number of powerful princes, but the influence of the dynasty rapidly declined.

SINDING, Christian, composer, born at Kongsburg, Norway, in 1856. He studied under Reinecke at the Conservatory of Leipsic, Germany, and later at Dresden and Berlin. Subsequently he became a teacher and organist in Christiania. He is the composer of many quartets, quintets, and symphonies, many of which are popular on the continent and in America.

SINGAPORE (sĭn-gä-pōr′), meaning Lion City, a seaport of Asia, situated on a small island off the southern shore of the Malay peninsula. The island is separated from the mainland by a narrow strait, and is one of several forming the British Straits Settlements. These islands have a generally fertile surface and a hot climate and produce sugar cane, nutmegs, pepper, cloves, ginger, tropical fruits, and vegetables. Formerly the island was the site of the capital of a Malayan kingdom, but it was captured and destroyed in the 13th century. Singapore was founded in 1819 to facilitate trade in the East Indies and now ranks as an important commercial center. The streets are regularly platted and well improved. It has a fine and safe harbor. Among the principal buildings are several cathedrals, Hindu temples, Mohammedan mosques, and Chinese joss houses. It has a number of hospitals, secondary schools, a museum, and zoölogical and botanical gardens. The newer improvements include electric lighting, pavements, public waterworks, sewerage, and rapid transit. On its streets may be seen a peculiar medley of Chinese, Hindus, Malays, Jews, Armenians, and Europeans. Population, 1922, 338,864.

SINGING, the art of uttering musical inflections or modulations of voice, or to produce music with the human voice. It depends in part upon training in the musical art, but to a considerable extent upon the physical development of certain organs of the body. The muscles of the chest and diaphragm are called into a complexity of action by singing, and the character of the tones is modified by the nasal chambers and the cavity of the mouth. However, the larynx, which contains the vocal cords, is of primary importance, since the length and form of the cords give pitch and some shades of quality to the voice. Air is taken in and expelled by the lungs through the muscles, and by this means sound is produced as the currents of air pass through the throat and act upon the vocal cords. No single individual is able to embrace the entire compass of the human voice, which ranges from C below the bass clef to F above the treble. Four parts are generally recognized in singing, these being the soprano, alto, or contralto, tenor, and bass.

The *soprano* begins at about E on the treble clef and includes the highest tones; the *alto,* or *contralto,* ranges from G on the bass clef to C on the treble clef; *tenor* extends somewhat lower than the contralto; and *bass* begins about C above the bass clef and includes all the lower tones. The average human voice has an extent of about twelve tones, but in trained singers the range is from two to three octaves. Two general divisions have been made of women's voices, the soprano and contralto, and three of men's, the tenor, barytone, and bass, these ranging from the highest to the lowest pitch.

SINGLE TAX, a term used by Henry George in his "Progress and Poverty" to describe a theory of taxation. It embraces the economic reform of raising all municipal, county, state, and national revenues by a single tax on land values. The author of the work contended that other taxes should be abolished gradually until at length all the expenses of the government will be derived from the single tax. He maintained that such a system, when once understood and applied, would greatly simplify government as well as provide that the burden of public expenditures be borne equitably by all individuals. The claim of its supporters is that it will operate to lighten taxation on the agricultural districts, where land has a comparatively small value in relation to that of towns and cities, in which the real property rises to an enormous value without bearing the proportion of taxes properly to be derived from such districts. It is argued that a large number of officers and taxgatherers who are now employed could be dispensed with, and that they would naturally seek to develop some wholesome enterprise in their respective communities. On the other hand, it is claimed that fraud and inequality would be abolished, trusts and monopolies would be avoided, and trade would be given perfect freedom to expand as the communities develop, instead of being restricted by a multiplication of taxes.

The single tax is to be levied on the land in proportion to its utility and without regard to its improvements, thus making it unprofitable to hold vacant tracts at enormous prices for speculative purposes, and as a result all such tracts in cities and agricultural districts would be thrown open to labor. Another contention

is that private ownership of land inclines to hold mankind in a condition of slavery, this view being taken because wealth is the result of labor applied to land, thus bringing the laborer to the mercy of the landowner. Hence, lands are not to be owned by individuals, but they are to be used at specified terms by the occupants. With this change in our economic system the supporters of the single-tax theory include the government ownership and operation of telephones, telegraphs, street railways, railroads, waterworks, and all similar enterprises. Besides, all excise and tariff taxes are to be abolished. The theory of a single tax has never been practically tested, but it has been partially applied in New Zealand and several other countries. Adherents to the single-tax theory have found their way into the Congress of the United States and the legislative bodies of other countries, and their views have been attracting greater interest from time to time, either in whole or in part.

SING SING. See **Ossining.**

SIOUAN (sōō'ăn), the name of a group of Indians found in North America. These natives occupied the greater portion of the plains at the time North America was discovered, but scattered bands had settlements which extended to the Gulf of Mexico and eastward to the Alleghenies. They penetrated far into Canada, from central Ontario to the Rocky Mountains, but were represented by the largest numbers in the south central part of the Dominion. The Siouan Indians were hostile to the whites, resisting encroachment upon their territory with marked bravery and determination. Among the principal tribes may be mentioned the Sioux, or Dakota, the Winnebago, the Ponca, the Osage, the Omaha, the Flathead, the Assiniboin, and the Mandan Indians.

SIOUX (sōō), or **Dakota,** one of the largest tribes of Indians in North America, originally inhabiting the region west of the Mississippi, from the Arkansas River to Lake Winnipeg. They joined the British in 1812, but soon after concluded peace with the United States. In 1837 they ceded lands along the Mississippi and made further grants in 1851. Hostilities arose soon after because the government failed to keep its treaties with them, and in 1862 about 1,000 whites were killed in the vicinity of New Ulm, Minn. The public authorities promptly reduced them and executed forty of the leaders, but the uprising and damages inflicted cost the government about $40,000,000. Several bands fled to the Territory of Dakota, while others found refuge in Canada. The government established a reservation near Yankton, S. D., and provided facilities to enable many of the Indians to engage in farming and stock raising. Sitting Bull remained dissatisfied and went to Washington, D. C., to secure a settlement of the differences, and afterward headed an uprising that terminated in the defeat and death of General Custer in 1876. The Sioux Indian tribe is still one of the largest, numbering about 25,000, and they are noted for their physical strength and skill in horsemanship. Many have made material advancement educationally and in the industrial arts.

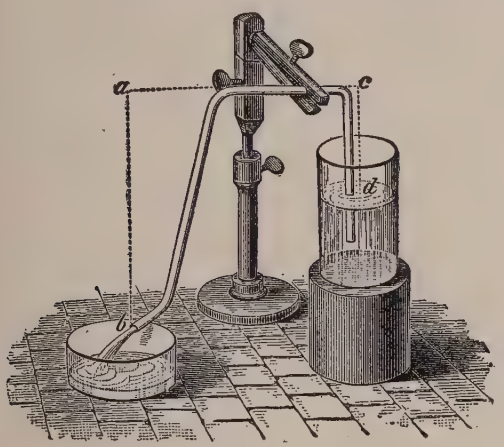
SIOUX CITY, a city in Iowa, county seat of Woodbury County, on the Missouri River, 158 miles northwest of Des Moines. It is on the Illinois Central, the Chicago and Northwestern, the Great Northern, the Union Pacific, and the Chicago, Milwaukee and Saint Paul railroads. It occupies a beautiful site on the bluffs of the river, which is spanned by several bridges, connecting it with South Sioux City, Neb. Among the principal buildings are the high schools, the county courthouse, the Union Depot, the Federal building, the Lutheran Hospital, the city hall, the public library, the Saint Joseph's Mercy Hospital, the Y. M. C. A. building, and many fine churches. It is the seat of the Morningside College (Methodist) and Trinity College (Catholic). The parks system comprises over 1,000 acres, including Stone Park, which is a fine tract of native woods and scenic slopes.

Sioux City has a large jobbing and commercial trade. It has extensive railroad shops, foundries, breweries, and meat-packing establishments. Among its general manufactures are agricultural implements, furniture, starch, flour, stoves, soap, hardware, clothing, brick, and cured meat. The streets are well graded and many have been paved with brick, asphalt, or macadam. Waterworks, sanitary sewerage, and electric street railways are among the public utilities. The place was platted in 1854 and incorporated in 1857. Population, 1925, 76,411.

SIOUX FALLS, the largest city of South Dakota, county seat of Minnehaha County, on the Big Sioux River, sixty miles northeast of Yankton. It is on the Illinois Central, the Great Northern, the Chicago and Northwestern, the Chicago, Milwaukee and Saint Paul, and the Chicago, Rock Island and Pacific railroads. It is surrounded by a fertile farming and stockraising country. In the vicinity are deposits of red granite and from quarries shipments are made to many points in the central west. Among the noteworthy buildings are the county courthouse, the high school, the State and Federal prisons, the public library, the post office, and many churches. It is the seat of the Augustana College and Normal, the Sioux Falls College, the All Saints' School, and theState school for deaf-mutes. Immense water power is supplied by the falls on the Big Sioux River, which descend about 100 feet. It has manufactures of machinery, biscuits, bread, packed meat, and dairy products. It was settled in 1867 and incorporated as a city in 1883. Population, 1905, 12,283; in 1925, 30,127.

SIPHON (sī'fŏn), a bent tube with limbs of unequal length, used for drawing liquids from one vessel into another. A common siphon is

shown in the illustration. When the shorter limb (c, d) is immersed in the water of the glass vessel and the tube is filled with the liquid by suction or otherwise, the water flows out of the vessel because of the greater weight in the longer limb (a, b) until the liquid in the lower vessel is at a level with the surface of that in the vessel from which it is drawn. The shorter limb is kept full by atmospheric pressure, and



SIPHON.

thus the height over which the liquid may be raised is restricted, lessening as the liquid decreases. It is possible to siphon water to a height of 32 feet, but denser liquids cannot be successfully siphoned to that height, unless pressure is put on the surface containing the shorter limb. The siphon is used for various purposes, especially in racking wines and liquors, in drainage, and in aqueducts.

SIREN (sī′rĕn), an instrument used to produce musical sounds and to aid in ascertaining the number of sound waves or vibrations per second which produce a note of a given pitch. The simple siren is a revolving disk with a series of holes pierced through the upper plat to which is closely fitted a revolving disk with openings in an opposite direction. When air is forced by means of a bellows or some apparatus that furnishes pressure, the successive puffs of air produce tones. It is possible for the ear to distinguish the successive puffs when the disk revolves slowly, but a uniform note of a high pitch is obtained when the revolutions exceed ten per second. Large instruments of this kind are used as fog signals, but these are operated by steam.

SIRENIA (sī-rē′nĭ-à), an order of aquatic mammals, including the dugongs and the manatees. The body is formed somewhat fishlike and they live habitually in the water. These animals have no hind limbs and the fore limbs are present as flippers. They live on plants found in the sea and are most numerous in the deltas and mouths of rivers. Fossils occur in large numbers in the Eocene Age. See **Dugong; Manatee.**

SIRENS (sī′rĕnz), in Greek legends, the sea nymphs that were seated on the island of the Sirens, off the southwest coast of Italy. Homer relates in his *Odyssey* that Circe warned Odysseus not to listen to the song of the Sirens, for all who gave ear to their enticing strains felt an unconquerable desire to leap overboard and join them, when they either perished in the hands of the nymphs or were engulfed by the waves. Odysseus had his crew fill their ears with melted wax, but he so fondly loved adventure that he had his comrades lash him to the mast under promise that they were not to release him until they were out of sight of the island, no matter how much he might implore them to set him free. As the alluring strains fell upon his ears, he forgot all danger and entreated his companions to release him, which they refused to do until the enchanted island had been lost to view. When the danger was past, he gratefully acknowledged the firmness of his followers, which had been the means of saving his life. The Sirens are represented in art as having the form and wings of birds and the faces of youthful maidens. In some sculptures they have the form of maidens with claws instead of feet.

A SIREN.

SIRIUS (sĭr′ĭ-ŭs), or **Dog Star,** the principal star in the constellation Canis Major, or the Greater Dog, and the brightest star in the sky. It is situated a little below Orion and, according to mythology, is one of the hounds following that heavenly constellation. In the 2d century Ptolemy classed Sirius among the red stars, but it is now a brilliant white, its light being 325 times as great as that of a star of the sixth magnitude. The mass is about twenty times as large as the sun. Astronomers estimate that Sirius is about a million times farther from us than the sun and express the view that it is constantly receding from the earth.

SIROCCO (sĭ-rŏk′kō), or **Scirocco,** the name given in Italy to the hot, oppressive wind blowing across the Mediterranean from the desert of North Africa. It usually continues to blow from three to six days and, like the simoom, is inclined to bring on a feeling of exhaustion and suffocation. The greatest effect is felt in Malta and Sicily, but it also reaches the Ionian Islands and southern Greece.

SISAL (sī′säl), or **Grass Hemp.** See **Hemp.**

SISYPHUS (sĭs′ĭ-fŭs), in Greek legends, a

noted king of Corinth, who was famed for promoting navigation and commerce. Writers credit him with founding the city of Corinth (Ephyra) and the establishment of the Isthmian games. In his later life he became cruel to travelers who visited his dominions, and often slew them by hurling upon them enormous pieces of rock. He was punished for his crimes by being compelled to roll a huge block of stone up a steep hill, which, on reaching the summit, rolled back to the plains below, thus making his task endless.

SITKA (sĭt'kà), a city of Alaska, on the west coast of Baranof Island, 1,135 miles northwest of Seattle and 160 miles southwest of Juneau. The harbor is deep and commodious and near it are a number of islands. Toward the inland rise snow-clad mountains, which have clusters of shrubs and trees on the lower slopes. The climate is cold, having an average temperature of 42° Fahr., while the rainfall is about ninety inches. Vegetables of various kinds are produced, but oats does not ripen in the short summer season. Among the principal buildings is a Greek church, an industrial school, a museum, a hospital, and a number of business storehouses. Salmon canning, mining, lumbering, and gardening are the chief industries of the surrounding country. A company of Russians established a trading post at Sitka in 1799, when it was called New Archangel, and after the purchase of Alaska, in 1867, it became the capital. In 1906 the seat of government was transferred to Juneau. Population, 1922, 1,120.

SITTING BULL, distinguished Sioux Indian chief, born in Willow Creek, in 1837; slain on the Grand River, Dec. 15, 1890. His Indian name was *Tatanka Yotanka,* and he showed a peculiar hostility toward the whites from early manhood. He commanded a band of Indians in the massacre in Minnesota and at Spirit Lake, Iowa, in 1862, and soon afterward found refuge in the Yellowstone region of Wyoming. In 1868 he was defeated in the Battle of Mussel Shell, but remained constantly on the warpath, partially because the government failed to carry out the terms of several treaties. Continuous friction occurred between the settlers and the Indians, and in 1876 General Custer was sent against the hostile tribe, but he and his entire force perished. General Terry was sent in pursuit of Sitting Bull, but he escaped with his band into Canada. When the government, in 1880, promised pardon to the Indians, he surrendered to General Miles and returned to Dakota. In 1890 another extensive insurrection broke out, and in the battle that resulted he and several others were slain.

SIUT (sē-o͞ot'), or **Assiut,** a city of Upper Egypt, capital of a province of the same name, 250 miles south of Cairo. It is situated on the west bank of the Nile, on the Cape-to-Cairo Railway, and is surrounded by a fertile section. A large dam is maintained across the Nile as a means of utilizing the water for irrigation. In the vicinity are ruins of extensive buildings erected at an early date in the history of Egypt, including tombs adorned with paintings and sculptures of historical value. The city has electric lights, public baths, and several fine mosques and bazaars. Pottery, pipebowls, clothing, and utensils are manufactured. Population, 1922, 46,106.

SIVA (sē'vȧ), the third person of the divine trinity of the Hindus, representing the principal of destruction. He is not mentioned in the Vedic hymns, but is referred to in many writings of the later Brahmanic literature. The linga is his symbol, which represents the creation that is to follow destruction. In statuary he is represented with five heads and three eyes, signifying the five-faced and the three-eyed. The representation of the Ganges, the sacred stream of the Hindus, is upon his head, and he holds a trident in one hand. As a destroyer of the world he is represented as of black color and he carries as his weapons an ax, a bow, and a thunderbolt. See **Vishnu.**

SIX NATIONS. See **Iroquois.**

SIXTUS (sĭks'tŭs), the name of five popes of Rome who reigned within the period between 119 and 1590. Sixtus I. was pope in 119-127; Sixtus II., in 257-259; and Sixtus III., in 432-440. The others are treated in articles below. See **Pope.**

SIXTUS IV., Pope of Rome, born near Savona, Italy, July 21, 1414; died Aug. 12, 1484. The village of Celle was his birthplace. He took the Franciscan vow at Savona and early attained a reputation for eloquence and learning. He was made cardinal by Paul II., in 1467, and was elected Pope on Aug. 9, 1471. Writers have made conflicting statements as to his administration of the pontifical office, but all agree that he lavished the treasures accumulated at Rome by providing for his relatives and for the purpose of improving the city and the architecture of the church. Among the structures built by him are the Sistine chapel and the Sistine bridge across the Tiber. He gave encouragement to painters and sculptors and greatly enlarged the Vatican library. Sixtus was the first Pope to send missionaries to the Canary Islands. A general Italian war was caused by his alliance with the Venetians against the Duke of Ferrara, which ended in dissolving the Venetian alliance. He was the author of several treatises, among them "De Sanguine Christi."

SIXTUS V., Pope of Rome, born near Montalto, Italy, Dec. 15, 1521; died Aug. 27, 1590. After receiving a liberal education, he was made professor at Rimini and Siena, and afterward became inquisitor-general in Venice. In 1565 he accompanied the papal legate to Spain and in 1570 was made cardinal by Pius V. He was intrusted with editing the corrected edition of the works of Saint Ambrose, which

were published in 1585. He was not in favor with Gregory XIII. and lived in retirement, but on the death of the latter was made Pope, in 1585. His administration of the office was able and energetic. Through study and discretion he attained a high standing among the popes as a ruler and statesman. Besides restoring order in the church, he regulated the finances, suppressed lawlessness, and encouraged commercial enterprises. He fixed the number of cardinals at seventy, published a new edition of the Vulgate, which had been ordered by the Council of Trent, improved the Vatican library, and paved the way for vigorous opposition to the growing power of the Lutherans and the Huguenots. Sixtus accumulated vast treasures, which he left to his successors for the purpose of extending the influence of the church.

SKAGER RACK (skäg'ĕr rȧk), or **Skagerrak,** a channel extending from the North Sea between Norway and Denmark, communicating with the Cattegat. The length is 140 miles; width, 75 miles; and the depth is sufficient for the largest vessels. Several good harbors are located on the coast of Norway and Sweden. The Skager Rack, the Cattegat and the Sound form an important connection between the Atlantic and the Baltic Sea.

SKAGWAY (skăg'wȧ), a port of entry in Alaska, at the mouth of the Skagway River, 202 miles north of Sitka. It is situated on the Lynn Canal and the White Pass and Yukon Railway, and has steamboat connections with Seattle and other cities on the Pacific. The chief buildings include those of the government, the public library, and several hospitals and public schools. Breweries, lumber mills, bottling works, and trading are the principal industries. It has a large trade in merchandise and supplies with points inland, especially the Yukon mining district. The first settlement in its vicinity was established in 1897 and it was incorporated in 1900. Population, 1900, 3,117; in 1920, 872.

SKALD (skȧld), or **Scald,** the name of a class of Norse poets, especially applied to those who were advanced in educational training. They wrote a class of literature in which the deeds and exploits of their warriors and ancestors received prominent mention. In later times the courts employed skalds to prepare writings of a dramatic character. Several hundred of these writers are mentioned in the Icelandic literature and by historians.

SKAT, the name of a game played with cards, considered the most intricate of the games in which cards are used. The 32 cards that enter into a game of euchre are used, but the picture cards are not double-ended. Only three active players take part, but one or two associates may join. This game was originated in Altenburg, Germany. It requires a manual or guide to aid the beginner.

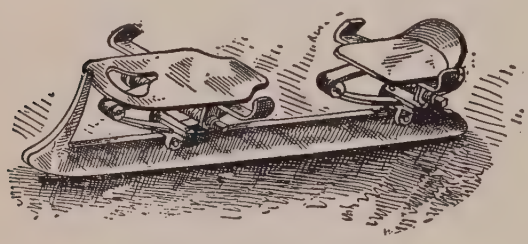
SKATE (skāt), the name of several species of fishes of the ray family, having a peculiarly flat body. The snout of most species is pointed the tail is long and slender, and the upper part of the body is of a grayish or a mottled color. Among the American species are the *barndoor* and the *tobacco-box* skates. Those of Europe include the *common* and *long-nosed* skates. The long-nosed skate has a remarkably long and sharp snout and its body is between four and five feet in length. The common skate is very abundant in European waters and attains a large size. It usually weighs about 100 pounds, but sometimes specimens are obtained that weigh as much as 200 pounds or more. This species has a body whose breadth is greater than its length, the proportion being about four to three. This phenomenon, which is common to several species, is due to the expanding pectoral fins being concealed in a peculiar manner under the skin. See **Ray.**

SKATES, a class of devices that have a frame formed to fit the sole of a shoe, with a keellike runner of steel attached beneath. They are designed to move or glide over the ice. The earliest skates were made of the shinbones of animals, which were fastened to the feet by means of strings. It is thought that the first iron or steel skates were used in Holland, where they served to traverse the numerous canals, and in that country they are still worn by men and women when going to the city to engage in business for the day or to do shopping. Skates are employed extensively for a like purpose in Denmark, Sweden, and Norway, and in the two countries last mentioned the *skee,* or *ski,* is very common. The skee is a kind of toboggan for the foot, consisting of a long and narrow wooden runner, to which the shoe is attached, and is used for sliding over snow or ice. A skillful traveler is able to slide from ten to fifteen miles per hour on a skee, this depending somewhat on the character of the snow or ice, while the skate enables moving with rapidity only when the surface is quite smooth.

Many varieties of skates have been contrived, the construction differing somewhat with the purpose they are to serve. Formerly the frame designed to fit the sole of the shoe was made of wood and it was fastened by a heel screw and straps. At present metal is employed instead of wood, and greater security in fastening to the shoe is obtained by springs instead of straps. Skates for speed have a thin runner somewhat longer than the shoe, while the blade of those intended for figure skating is broader and rounded at the toe and heel.

Skating is an important branch of athletics, both in America and Europe. Many skating societies are maintained in the United States and Canada, the most important being the National Skating Association, which holds races annually. The best time made in America is one-half mile in 1.21 minutes, one mile in 2.50, three miles in 9.18, and five miles in 15.93. James L. Plimpton of New York invented the

roller skates in 1869, which are the only substitutes for ice skates that have ever proved successful. These consist of a frame to fit the sole of the shoe. They have two sets of parallel wheels, one each at the toe and heel, which set squarely on the surface whether the body



METALLIC SPRING SKATE.

of the skater is canted or upright. Roller skating is usually conducted on wooden or asphalt floors in rinks constructed for that purpose, but the fatigue is much greater than that accompanying skating on ice.

SKEAT (skēt), **Walter William,** philologist, born in London, England, Nov. 21, 1835; died Oct. 7, 1912. He studied at London, and in 1858 graduated from Cambridge University, where he became a fellow in 1860. In 1878 he was made professor of Anglo-Saxon at Cambridge, and in 1883 became a professor in Christ's College of that institution. His writings are very numerous and many of them have been widely translated. He translated Uhland's "Songs and Ballads" from the German, lectured extensively, and contributed to many magazines and periodicals. Among his principal works are "Etymological English Dictionary," "Principles of English Etymology," and "Concise Etymological Dictionary." He published extracts from several authors, including Chaucer's "Canterbury Tales," "Lay of Havelock the Dane," "Piers the Plowman," and "Kingis Quhair."

SKELETON (skĕl'ĕ-tŭn), the framework of animals, which in vertebrates is composed of bone and cartilage. It serves to support the fleshy parts and the nervous system, and forms levers for the muscles. In lower animals various structures take the place of the skeleton, as the shell of the clam, oyster, crawfish, and lobster. These formations are called *exoskeletons,* or *dermoskeletons.* The skeleton of vertebrates consists of the skull, the trunk, and the limbs, the whole constituting the *interior skeleton,* or *endoskeleton.* In man the skeleton is constructed after the same type as that found in some of the higher animal forms, but it is of an immeasurably higher development. The human skeleton is characterized by a relatively larger capacity in the skull for the brain development, longer arms, more convenience in the position of the foot, and more freedom of the lower limbs. These superior conditions give to man the ability to move with greater facility and aptness than any other living being.

The skeleton consists of about 200 bones, the number varying somewhat according to age. In the head are 22 bones, which are classed as eight skull bones and fourteen face bones. There are eight bones in the cervical region, 37 in the thorax, 64 in the upper limbs, five in the lumbar region, four in the pelvis, and 60 in the lower limbs. Several bones that are separated in youth become united later in life. Thus five of the false vertebrae at the base of the spine early join into the *sacrum,* while four tiny ones below it often grow into a bony mass called the *coccyx.* The sternum, composed of five pieces in childhood, consists of only three in the adult. While there is a change in the number of bones, their relative dimensions are adjusted with such exactness that the length of the entire skeleton can be obtained by measuring a single one of the principal bones. All the bones, removed from the body for the purpose of examination and study, form a *natural skeleton,* if connected by dried ligaments. An *artificial skeleton* is made by the bones being joined together by wire. See illustration on following page.

The names of the bones in the human skeleton are shown in the accompanying table:

NAMES OF THE BONES OF MAN.

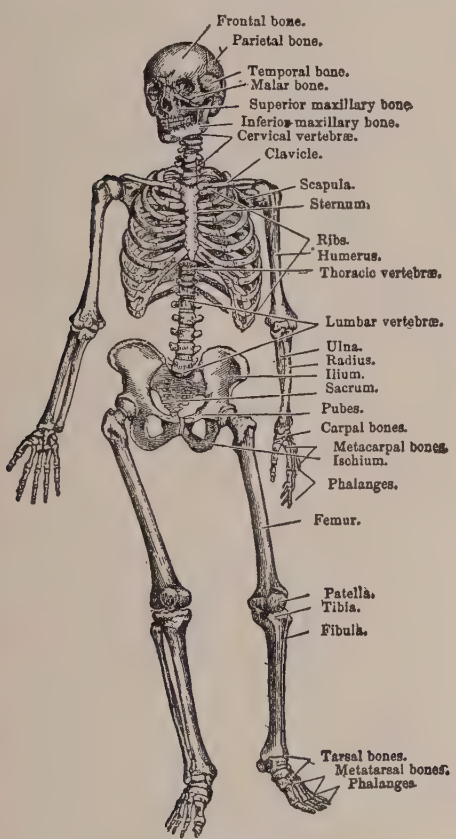
Head	*Skull*	Frontal (forehead).
		2 Temporal (temples).
		2 Parietal (side).
		Occipital (posterior base).
		Sphenoid (base).
		Ethmoid (base of nose).
	Face	2 Superior Maxillæ (upper jaw).
		2 Nasal (bridge of nose).
		2 Malar (cheek).
		2 Lachrymal (corner of orbit).
		2 Turbinated (within nostrils).
		2 Palate (posterior hard palate).
		Vomer (nasal partition).
		Inferior Maxilla (lower jaw).
Cervical Region		7 Cervical Vertebræ (neck).
		Hyoid Bone (base of tongue).
Thorax		14 True, 6 False, 4 Floating Ribs.
		12 Dorsal Vertebræ (back).
		Sternum.
Upper Extremities	*Shoulder*	Clavicle (collar).
		Scapula (shoulder blade).
	Arm	Humerus (arm).
		Radius, Ulna (fore arm).
	Hand	8 Carpal (wrist).
		5 Metacarpal (hand).
		14 Phalanges (fingers).
Lumbar Region		5 Lumbar Vertebræ (loins).
Pelvis		2 Innominata.
		Sacrum.
		Coccyx.
Lower Extremities	*Thigh*	Femur.
	Leg	Patella (knee pan).
		Tibia (large bone).
		Fibula (outer bone).
	Foot	7 Tarsal (instep, heel).
		5 Metatarsal (arch).
		14 Phalanges (toes).

See **Bones; Foot; Hand; Head,** etc.

SKELTON (skĕl'tŭn), **John,** poet, born in Norfolk, England, about 1460; died June 21, 1529. He graduated at Cambridge in 1482 and later studied at the University of Oxford. In 1498 he was ordained as deacon and soon after became tutor to Prince Henry, afterward Henry VII., who held him in high esteem. For some time he served in the position of jester and poet laureate at court, but in 1504 he was elected

to the office of royal orator. His writings were praised by Erasmus and esteemed by the wits of his time. He published "The Garlande of Laurell," "The Tunnynge" (the brewing), and "Why Come Ye not to Courte?" (a satire on Wolsey).

SKEPTICISM (skĕp'tĭ-sĭz'm), the system of philosophy which denies or doubts the existence of knowable truths or realities. As a doctrine it teaches that no fact or principle can be known definitely, that all knowledge is uncertain. It embraces *Pyrrhonism* in that it assumes the position that no fact or truth, no matter how worthy of confidence, can be established on philosophical grounds. In this sense it is opposed to the positive assumption, or assertion, of definite principles. The term skepticism is applied in theology to a doubt of the truth of revelation, the denial of the being or existence of God, and the doubt or denial of the divine origin of the Christian religion. Those who embrace the tenets of skepticism are known as *skeptics*. Pyrrho, one of the early skeptics, advised his students to suspend judgment in view of the contradictory nature of phenomena, and held to the theory that absolute knowledge is impossible. His pupil, Timon, elaborated upon the elements of doubt by proceeding upon the premise that any proposition may be proven or contradicted by equally good reasons. David Hume's "Treatise of Human Nature" is a modern work on the subject of skepticism. This writer went so far as to question the validity of every act of conscience and is a representative of the modern school of skepticism. Kant, Spencer, and other writers, although sometimes classed as skeptics, more properly are agnostics.

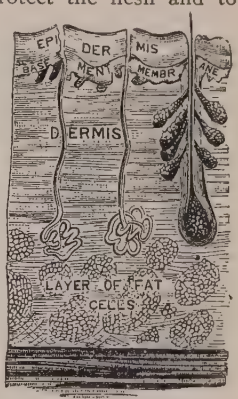


HUMAN SKELETON.

SKI (skē). See **Skates.**

SKIMMER, the common name of a genus of web-footed birds of the gull family. The lower mandible is compressed like the blade of a knife and is somewhat longer than the upper. These birds are sometimes called *scissorsbills,* for the reason that their bills are well adapted for cutting or scooping. The *black skimmer* is a common bird of the Atlantic coast of North America. It is about 20 inches long and the alar extent is 45 inches. The color is dark brown on the top of the head and upper surface, with markings of white underneath. It breeds on marshes and sandy islands, laying large, white eggs with ash-colored spots. Several other species, native to Europe and Africa, are known as *cutwater, shearbill,* or *razorbill.* These birds glide over the surface of the water and plow up small fishes with the immersed lower mandible. They are nocturnal in their habits, resting by day on the sandbars near the water. The female lays three or four eggs, which are hunted for food.

SKIN, the integument or outer covering of an animal, serving to protect the flesh and to fill important functions as an active organ. In vertebrates the skin consists of two layers, the external one called the *epidermis, cuticle,* or *scarfskin,* and the inner one called the *corium, cutis,* or *derma.* These two layers are separated by a basement membrane, as shown in the illustration. The epidermis has no blood vessels and is not sensitive, while the derma, or true skin, is permeated with nerves and veins and is highly sensitive. All the external parts of the body are covered by the skin.



SECTION OF THE SKIN.

The true skin is always protected by the epidermis, but is the thickest on the back, in the palm of the hand, and at the sole of the foot. Flat cells or scales compose the cuticle and these are shed constantly from the surface in the form of dandruff, or scurf, but they are renewed regularly from the cutis below. The cuticle thickens and becomes horny by constant use, thus supplying special protection to the

parts serving important purposes, as the hand of the blacksmith or mason in handling tools. The outer surface appears smooth to the naked eye, but when examined through a microscope the little scales may be seen plainly. Besides these, the skin has small elevations, called *papillae,* that serve important functions, some as organs concerned in the sense of touch and others as a basis for the growth of hair. Hair and nails are modified forms of the cuticle and have equally important functions. When the cuticle is not restored, a scar results.

The cutis contains the *sebaceous, fat,* or *oil glands,* with ducts that pour their secretions into the hair follicle, a minute depression of the epidermis and cutis. Each hair of the scalp is generally provided with two glands, situated above the hair follicle, and their function is to oil the hairs and keep the skin supple. People dwelling in hot countries are supplied with a greater abundance of oil glands to prevent the skin from drying. Besides, the skin has sweat glands, made up of tubes twisted in the form of a knot, leading to the surface by a long, sometimes spiral, duct. These ducts terminate in openings in the surface of the skin, called *pores.* Their function is to eliminate water from the system, to cool the body, and to expel certain waste materials that collect in the blood. It is estimated that there are about 2,225,000 pores in the human skin, and that generally about two and a half pounds of watery vapor are eliminated per day. However, this is greatly influenced by the clothing worn, the temperature of the air, the amount and kind of food taken, and the exercise indulged in.

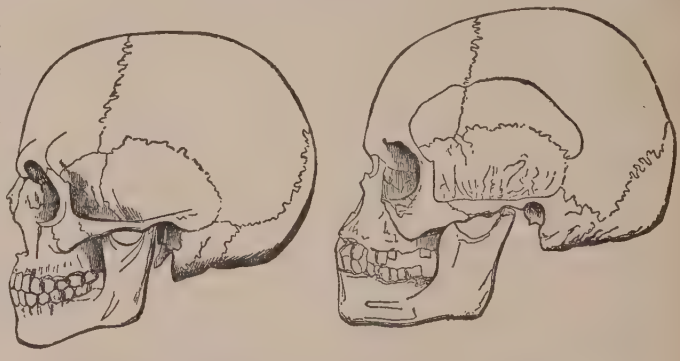
The skin serves as a respiratory organ, in that there is a small interchange of oxygen and carbonic acid gas. As an absorbing surface, it can take in water to a very limited extent. It has been found that death results when the pores of the skin are covered with varnish, and that it is highly essential to health for the skin to be kept clean by often washing it with soap and water. Baths not only remove accumulations of sensible perspiration on the skin, but tend to keep open the pores and facilitate the removal of dry scales as soon as they become loosened.

SKINK, a species of small lizards. The body is six to eight inches long and is covered with fishlike scales. It has a reddish-yellow color, but is marked by darker transverse bands. These animals have four strong limbs, but move somewhat like a serpent, and are able to enter small openings. They are quite numerous in the deserts of Africa and Asia, especially in the region of the Mediterranean. Several species are found in North America, ranging from Mexico to Alberta, but they are small, swift lizards and not true skinks.

SKIRRET (skĭr'rĕt), a perennial plant of China and Japan. It is cultivated for its edible root, which resembles that of a parsnip, but is clustered and somewhat aromatic. The plant grows to a height of six inches. Spirituous liquor is made from the root in some countries, owing to its having a large amount of sugar. Though cultivated in Europe, the plant is not grown extensively in America.

SKUA (skū'ȧ), or **Jaeger Gull,** a web-footed bird of the Gull family, widely distributed along the coasts of the northern seas. It is distinguished by having a strong bill, long wings, a wedge-shaped tail, and a full and stout body. In disposition these birds are quarrelsome. They frequently pursue terns and gulls to compel them to drop fish and other articles of food. All the species pursue and feed upon living birds in the habit of the hawk. The *Arctic skua* is about twenty inches long and has a wing expanse of four feet. It is frequently seen in winter as far south as the Gulf of Mexico.

SKULL, the framework of the head of a vertebrate animal. It consists of the cranium and face. The human skull has 22 bones, of which eight are in the cranium and fourteen are in the face, but besides these are the bones of the ear and the teeth. A marked difference is noticeable between the skull of man and that of lower animals, in that the human skull has larger brain capacity and relatively a smaller face and jaws. The oval form is the best to resist pressure equally applied on all sides, and ample protection to the delicate brain is provided by the bones being composed, in general, of two compact plates, with a spongy layer between them. The *frontal, occipital,* and two *parietal* bones form the vault of the skull and are united by notched edges called *sutures.* These joints are not entirely closed in infants, but on the top is an opening termed the *anterior fontanelle,* so named from the perceptible pulsations of the brain, and it does not disappear entirely until the second year after birth, though sometimes the opening remains still



SKULL OF EUROPEAN. SKULL OF NEGRO.

longer. The skull grows rapidly during the first seven years of life and upon attaining full development the interior capacity is about 85 cubic inches, though often 92 cubic inches. Intelligence is estimated largely from the structure of the skull, the highest development being found in the Caucasian and the lowest in the mongrel races of Malaysia. In some races there is an approach to the lower animals, since the jaw projects forward to a remarkable degree and the forehead recedes. See **Face; Head; Facial Angle,** etc.

SKUNK, a genus of quadrupeds of the weasel family, which are native to North America. They are about the size of a large cat. The common skunk has a long tail and very

SKUNK.

short legs. The general color is black, with white patches on the head and body. It is about twenty inches long and its tail is thirteen inches. The skunk resembles the polecat in having a potent and disagreeable odor that can be perceived at a long distance, which it emits from anal glands. These glands secrete a fluid that is thrown with considerable force when the animal is acting in self-defense or is scared, and its disagreeable scent can be removed only with much perseverance. Several species have been enumerated. They differ somewhat in size, but their habits are quite similar. They feed on eggs, birds, insects, reptiles, fruits, and small animals, which they hunt at night. The winter is passed largely in a dormant state. The flesh of the skunk is considered a wholesome food by the Indians and others, being tender and nutritious. Skunk grease is of value in dressing leather and the skins are important for their fur.

SKYE (skī), an island of the Hebrides, lying off the western coast of Scotland, next to Lewis the largest of the group. It has an area of 535 square miles. The shores are indented by numerous gulfs and bays, most of them having precipitous shores. A large part of the surface is mountainous. The Cuchullin, or Coolin, Hills are the highest elevations, their culminating peaks rising about 3,200 feet above sea level. It has valuable fisheries and productive crystalline limestone quarries. The chief soil products include oats, potatoes, and vegetables. Cattle and sheep rearing is the most important industry of the interior highlands, where pasturage of considerable value abounds, but the soil is not of material value for the production of cereals. Most of the land is owned by proprietors and attended by tenants, who use quite primitive methods in farming. The inhabitants are chiefly Celtic and speak the Gaelic language. Many Danish antiquities abound on the island. Portree, the principal seaport, has an excellent harbor and a considerable trade in merchandise. Population, 1922, 16,045.

SKYE TERRIER. See **Terrier.**

SLAG, a fused compound obtained in the reduction of metallic ores, consisting of silica in combination with bases, such as lime or alumina. All classes of slags contain some metallic ores, owing to the fact that conditions necessary to extract all the metal cannot be obtained. Anciently the proportion of metal wasted was quite large, and in recent times many of the old slags have been smelted profitably. Ideal conditions require that the fluidity be such that the metal may sink steadily through the slags, that undesirable bodies be not separated from themselves, and that they fuse at the right temperature. Slags are various in color, owing to the presence of different metallic oxides. Copper gives them a red or reddish brown, manganese a dark brown, and iron oxides a dark green or black color. In many of the older countries, slag is used for road building and other purposes.

SLANDER. See **Libel.**

SLATE, a kind of rock resembling shale, but differing from it in splitting readily into thin plates or sheets. It includes species having a variety of colors, among them bluish or grayish black, reddish brown, and greenish blue. Most species may be cut or scratched with a knife. Slate occurs in all countries having metamorphic rocks, and the quarried products are used for many purposes in manufacture and construction. The deposits differ in thickness and sometimes several grades of slate are found in different parts of the same quarries. Their uses depend upon the particular composition and the size of the sheets that may be obtained. Fine-grained species, yielding large, thick slabs, are used to make billiard tables, burial vaults, electrical switchboards, and sinks. The more fissile grades, which split into thin slabs, are employed for roofing and school blackboards. Slate is utilized in making whetstones and polishing and a soft variety is used for slate pencils. The most extensive deposits occur in Pennsylvania, Vermont, New York, and Quebec, where slate quarrying is an important and growing industry. Products from these quarries are transported to South America, Australia, China, and many countries of Europe, the principal exports being for roofing and interior decorative use. Extensive deposits of slate occur also in other sections of North America, and in Wales, France, and Scotland.

SLATER, Samuel, capitalist, born at Belper, England, June 9, 1768; died April 21, 1835. He entered the factory of Jedidiah Strutt, a cotton spinner, at the age of fourteen. In 1789 he came to New York City and soon after started in the enterprise of cotton spinning at Pawtucket, R. I. This was the beginning of the cotton textile industry in the United States. In 1812 he erected extensive cotton mills in Massachusetts and elsewhere and later engaged in the manufacture of woolen textiles. John Fox Slater (1815-1884), his nephew, made a gift of $1,000,000 to aid in the education of the Negroes. This gift was placed in the hands of a board of trustees and is known as the *Slater Fund.* The income is devoted to the construction of buildings and the teaching of worthy students, especially in manual training and industrial arts.

SLAUGHTERHOUSE CASES, a number of notable causes at law decided by the Supreme Court of the United States. These cases grew out of an attempt made by the Legislature of Louisiana to restrict the slaughtering of animals in New Orleans, as a means to protect the public health of the city. This legislation in Louisiana restricted the butchering business to such an extent that it was practically prohibited by the general public, hence the cases were carried to the Federal courts and a final decision was reached in 1872. The decision is to the effect that the Fourteenth Amendment to the Constitution of the United States does not deprive the states of their right to establish police regulation, that this remains unimpaired with the states, and that it belongs to the states to provide security and protection for their citizens. The decision is looked upon as recognizing the greater rights of states and as a reactionary movement in the tendency of the Federal government to usurp the powers belonging to the states.

SLAVERY (slāv'ĕr-ў), the institution under which human beings are held as the property or chattels of others. It implies the complete subjection of a person to the will and command of a master. The institution is as old as human history and still exists in some countries under modified forms. In the barbarity of remote antiquity victory in war was not complete until the adversary was put to death, but later the death penalty was inflicted only upon prominent leaders, while the rank and file were carried as captives of war into foreign lands and subjected to servile slavery. All the nations of antiquity practiced slavery in some form and utilized slave labor in the construction of highways, canals, aqueducts, pyramids, harbors, and military walls. They employed slaves in the productive arts, such as agriculture, commerce, and architecture. The Jews treated their slaves with considerable kindness and those of native blood were released after seven years of servile service.

Greece and Rome. Slavery was a vast institution among the Greeks, who employed slaves in domestic service and in the industries. They used them in the police and military services. For centuries the Greeks made the distinction of excluding the slaves from attending the gymnasia and public assemblies, but permitted their entrance into the temples and as spectators at festivals. Several writers have collected evidences to the effect that slaves were treated with harshness at Sparta, but they were protected at Athens from cruelty and severe abuse. Slavery among the Romans was an extensive and systematized institution, consisting of two classes of slaves, the captives of war and the debtors who were unable to meet their obligations. At first the Roman slaves had few rights to be respected, being entirely subject to their master, who was permitted on slight misconduct to take their lives without process of law. Later the institution so affected the industries that all the handicrafts, professions, and even literature were more largely under the direction of slaves than freemen. The rise of the empire witnessed a marked improvement in the condition of the slaves, who received legal standing in the time of Augustus, and their lives were placed under the protection of the state by Antoninus.

Western Europe. While the New Testament does not directly attack slavery, its teachings are quite inconsistent with the maintenance of such an institution. As Christianity spread over Europe, the harsher system of slavery was transformed into the milder serfage of the Middle Ages. The Koran, on the other hand, permits the acquisition of slaves by conquest, and this method was resorted to quite extensively in the time of the Crusades, but there were also importations of Negro slaves to Western Asia from the region south of the Mediterranean. Afterward Rome became a market for white slaves, who were sold into Mohammedan captivity, and subsequently a white slave piracy rose in the Barbary States, which attained a widespread influence in the 17th century. The Celts and other natives of Britain were enslaved by the Anglo-Saxon invaders, who carried on a considerable trade in Irish slaves with continental Europe. The system was discontinued with the Norman conquest in the 11th century, only to give place to serfdom under the feudal lords. Traces of serfs and serf labor remained in Scotland to the close of the 18th century and in other countries still later. See **Serf.**

Slave Trade. The discovery of America gave a new and enlarged impetus to the slave trade. It was first sought to impress the Indian into service and make his race subject to the European conquerors of the new world, but it soon became apparent that the native American could not be successfully utilized in that way. As a result, Negroes were hunted in the interior of Africa and brought to the colonies. The first

slaves brought from Africa were landed at Santo Domingo by the Portuguese in 1503, and shortly after all the Christian colonial powers entered with more or less vigor in support of the slave trade. A Dutch ship landed the first cargo of slaves on the coast of Virginia in 1619, and the British government favored such importations into all of its American colonies. The traffic was very inhuman in many respects, the unfortunate Negroes in Africa being hunted with bloodhounds, crowded into unsuitable transports, and often treated with great cruelty upon reaching the American colonies. Sir John Hawkins was one of the most noted and persistent of the early British slave traders. It is estimated that about 925,000 slaves were brought to Jamaica alone prior to 1786.

William Penn and the Quakers have the credit of being the first Americans to strongly denounce the slave trade, but later societies sprang up in America and many European countries which advocated the suppression of the traffic and the gradual liberation of those in slavery. Though the Stuart kings of England and Queen Anne fostered the slave trade, sentiment became so pronounced against it that by the close of the 18th century its abolition became apparent. The French national convention paved the way in 1794 by declaring the freedom of the slaves in the French colonies. The British Parliament passed the famous Abolition Act in 1807, which made the slave trade by British subjects illegal after Jan. 1, 1808, and in the same year the slave trade was prohibited by law in the United States. Soon after the traffic was abolished by all the civilized countries. This important movement was now followed by the proposition to liberate the slaves who were already under bondage.

Abolition of Slavery. Abolition societies were founded as early as 1780 in many Northern States of the United States, where the institution of slavery was never considered profitable, but the Southern States clung to their slaves with a growing interest. Washington and Jefferson were opponents of slavery until the invention of the cotton gin made it profitable in the Southern States, when they supported the institution, but Benjamin Franklin, John Jay, Alexander Hamilton, William Lloyd Garrison, and other eminent leaders were rapidly forming public sentiment in the North in favor of its abolition. Many of the abolitionists dreamed of a free northern republic, while the proslavery party of the South maintained views favorable to the organization of a southern republic in which slavery was to be legally recognized. Treaties between the radical elements resulted in the Missouri Compromise of 1820 and the Compromise of 1850, but the growth of new territory continually unsettled and changed conditions.

The election of Lincoln, in 1860, precipitated the secession of a number of Southern States, thus hastening the Civil War, which extended from 1861 to 1865, and the Emancipation Proclamation issued on Jan. 1, 1863, liberated about 4,000,000 slaves. This was followed, in 1865, by the adoption of the Thirteenth Amendment to the Constitution, which received the approval of 27 of the 36 states, and thus slavery became prohibited in all territory belonging to the United States. Slavery was abolished by England in 1831, by Holland in 1863, by the Spanish in Cuba in 1886, and by Brazil in 1888. The number of slaves in America varied greatly. The slaves in the colonies were computed at 300,000 in 1776. In 1790 there were 697,897 in the United States; in 1850, 3,204,313; and in 1860, 3,953,760.

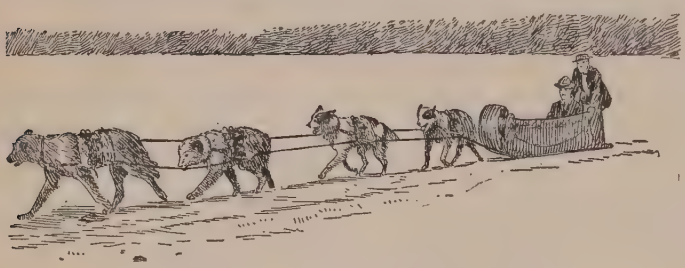
Present Aspect. A limited slave trade is still maintained on the eastern coast of Africa, mostly by Arabs, and the institution of slavery is recognized by law in some parts of Asia and interior Africa. The governments of Great Britain and Germany have been foremost in suppressing the slave traffic of Africa. These governments have promoted several treaties as a means to discontinue the system as an institution. With the extension of European authority in various parts of Africa, the development of the Congo Free State, and the application of modern industrial methods, the slave system is destined to ultimately become entirely superseded by free and competitive labor. It undoubtedly will be more difficult to overcome the practice in Western Asia than in Africa, since the Mohammedan faith is friendly to the use of slaves and the Moslem countries are practically impregnable to other religions and western industrial systems.

SLAVS (slävz), **Slaves, or Slavonians, a** branch of the Aryan family, which at present occupies large sections of Europe and the western part of Asia. The Slavs show a closer alliance to the Lithuanian than to the Germanic branch of the Aryan nations. In the early history of Europe they occupied the country tributary to the Carpathian Mountains. Subsequently they spread southward to the Adriatic and northward to the Baltic and overran large parts of Northern Asia. Their settlements on the Lower Danube date from the 6th century, when they passed into Thrace, Bohemia, Hungary, Styria, and other parts of Austria. In the 7th century they formed settlements in Bosnia and Servia, and ultimately spread northward over the region of modern Russia. A portion of their settlements in the south subsequently became a part of Greece and Turkey, while Hungary and parts of Transylvania were occupied by the Magyars and Rumanians, and large parts of Austria were taken by peoples of Germanic origin.

The two groups of Slavs include the western and the southeastern. The Poles, Czechs, and the Slovaks are comprised in the western group, and the Russians, Bulgarians, Slavonians, Servians, and Croats, in the southeastern. Ancient

writers generally agree in representing the Slavs as an industrious and brave people. They are credited with engaging largely in agricultural pursuits and supporting military movements rather for defensive than aggressive purposes. Their language shows a close alliance to the Sanskrit, but it is mixed considerably with the spoken tongues of other European peoples. Eight distinct dialects are recognized. They embrace the Russian, Bulgarian, Servian, Bohemian, Polish, Slovak, Polabic, and Wendic. The total Slav population of Europe is estimated at 170,000,000, but there are considerable numbers in other lands. The Greek Orthodox faith is supported generally by the Slavs, but many Poles, Slovaks, and Czechs are Roman Catholics.

SLED, or Sledge, a vehicle for conveying loads over ice or snow. It has runners constructed of cast iron, or of wood with a steel sole, and both runners are slightly turned up at one end. Primitive sleds are made wholly of wood and have two long runners, but those of modern manufacture employ iron or steel largely, and usually consist of two sets of runners, popularly called *bobsleds.* A *sleigh* is a carriage on runners, usually two, and is used for conveying passengers. These vehicles are finely constructed with one or two upholstered seats and are drawn by one or more horses. Sleighing is a favorite pastime in countries where the climate is sufficiently cold to prevent the snow from melting for several months in winter.



SLED DRAWN BY DOGS IN THE ARCTIC REGIONS.

SLEEP, a state of repose in which the activity of the senses and brain appears to be temporarily suspended. This state occurs periodically in man and animals and is characterized by partial or complete unconsciousness, relaxed condition of the body, and general diminution of vital functions. It is necessary that all parts of the body actively engaged in the discharge of important functions have a period of cessation from toil, and during the period of sleep the work of building up goes on to repair the loss occasioned by activity during the time of wakefulness. More sleep is needed in youth than in old age, when nature makes few permanent repairs and is content with temporary expedients. The number of hours required for sleep depends upon the character of employment and must be decided by each person according to apparent needs. From six to eight hours each day is the general average, but persons exercising their brain consecutively need more. It is of much importance that those who are tired should be allowed to sleep until awakened naturally, else the system does not obtain proper rest.

As compared to the state of being awake, the pulse and breathing are slower while sleeping, the secreting organs of the body are less active, and the pupil of the eye is contracted considerably. Another peculiarity is a lower temperature, especially from two to five o'clock in the morning, when the vitality is at the lowest point and mortality among the old and weak is greatest. It is generally assumed that dreamless sleep is the most restful and vitalizing, while a morbid tendency to sleep is the result of a degeneracy of the nervous tissue and a symptom of apoplexy. Sleep is prolonged in some animals, as in hibernation. The term *sleep* is applied in a varied sense to plant life, since the presence of light has a very marked effect upon the leaves, flowers, and other parts of vegetable growth.

SLEEPING SICKNESS, a disease which is peculiar to a region of Central Africa, extending from British East Africa to the Congo Free State. This disease has devastated many sections in the interior of the country. It spreads rapidly in the warm season, somewhat in the manner of yellow fever, and for a long time baffled the missionaries and physicians. It proved fatal along the lower Congo, on the Gold Coast, and even as far north as the Senegal. Dr. Robert Koch (q. v.) in 1907 discovered that it is due to the tsetse fly, which carries the infection in the same manner as malaria and yellow fever are spread by the *Stegomyia calopus* mosquito in the United States.

The disease first manifests itself by a mild remitting fever, accompanied by swollen lymphatic glands and an accelerated pulse, being due to the presence of a small number of parasites which infest the blood. In the second stage the fever becomes higher, the patient suffers with intense headache and apathy, and finally passes into a comatose condition. Dr. Koch discovered atoxyl, a derivative from arsenic, to be a true specific in causing the parasites to disappear from the blood. It was shown in 1907 that the fatality from the sleeping sickness is very extensive, several villages having been reduced in three years from 30,000 to 12,000 inhabitants. However, active operations to counteract the disease were instituted in 1908, when the English, German, and French governments formed a mutual working agreement. The plan is to segregate the infected in lazarets, remove villages from low and marshy places to higher lands, and establish extensive systems for drainage. These and other means are operating to limit the scope of the disease in the sections

where permanent settlements have been established by the European.

SLEIGH. See **Sled.**

SLIDELL (slī-dĕl′), **John,** public man, born in New York City in 1793; died in London, England, July 29, 1871. After graduating from Columbia College and studying law, he entered upon a successful practice of his profession at New Orleans, in 1819, and in 1842 was elected to Congress as a Democrat. President Polk appointed him minister to Mexico in 1845, but he was not formally received by the Mexican government, and returned to the United States in 1847. He served in the United States Senate from 1853 until 1861, supported the secession of Louisiana in the latter year, and became Confederate minister to France. Captain Wilkes seized him and James M. Mason on the high seas while *en route* to France and the two were confined in Fort Warren, Boston harbor, until they were released at the demand of the English government, on Jan. 1, 1862. They immediately embarked for France, but, failing to induce the French government to recognize the independence of the Confederate States, they negotiated a loan of $15,000,000 and secured the use of the ship *Stonewall.* Slidell settled in England shortly after the war, making his home in London.

SLIDE RULE, an instrument used to solve arithmetical problems. It consists of two parts, one of which slides upon the other, and on the surface of the parts are arithmetical linear scales. These are so related that it is possible to add and subtract by referring to the points as they coincide as the slide is moved. Multiplication and subtraction may be performed by means of logarithms, and natural sines, tangents, and the square or cube root of a number may thus be indicated.

SLIME MOLD, an organism usually classed as being of doubtful affinity, since it is difficult to determine whether it belongs to the animal or vegetable kingdom. Formerly the slime molds were classed as plants, but they show a close relationship to rhizopods, a class of protozoa. They consist of a mass of protoplasm during the growing stage, but are not definite in size and shape, and multiply by the development of spores. The spores burst and the protoplasm escapes in forms resembling those of an amoeba, each particle developing a delicate hair, or cilium. In this form the young life floats freely in the water, but later unites with other plants, sometimes a large number coalescing. Botanists recognize about 400 species, ranging from minute forms to some that are several inches in height.

SLING, a contrivance to throw missiles, such as stones or bullets. It consists of a small disk of leather pierced by a hole at each end for the attachment of strings about three feet long, and in the center is a small circular opening so as to permit the missile to lie quite firmly. When the stone or other object to be thrown is placed in the sling, it is held in one hand by the strings, and after whirling it in a circle one string is freed to permit the missile to fly out in the direction aimed. This simple contrivance was important as a weapon among the ancients, both in hunting and for military purposes. It is recounted that the Achaeans and Persians were skillful slingers. Goliath, the celebrated giant of Gath, was felled by David by means of a sling.

SLOANE (slōn), **William Milligan,** educator and author, born in Richmond, Ohio, Nov. 12, 1850. His father, James R. Sloane (1823-1886), was a pastor of the Presbyterian Church and a noted abolitionist, and in 1855 removed to New York City. The son studied at Mount Washington Collegiate Institute and Columbia College, graduating from the latter in 1868. Subsequently he taught in the Pittsburg Newell Institute for four years and in 1872 went to Berlin, Germany, to take an advanced course in philology. He was made professor of Latin at Princeton in 1877, secured the chair of history in 1883, and became professor of history in Columbia University, New York City, in 1896. His writings are numerous, including "Arabic Poetry Before the Time of Mahomet," "Life of Napoleon Bonaparte," "The French War and the Revolution," and "Life and Work of J. R. Sloane." He assisted George Bancroft in preparing the tenth volume of the "History of the United States," edited the "Life of McCosh," and was editor of the *New Princeton Review* and the *American Historical Review.*

SLOCUM (slō′kŭm), **Henry Warner,** soldier, born in Delphi, N. Y., Sept. 24, 1827; died in Brooklyn, April 14, 1894. He graduated from the West Point Military Academy, in 1852, and was assigned for service in the artillery. After attaining the rank of lieutenant, in 1856, he resigned his command in the army. Subsequently he studied and practiced law at Syracuse and was elected to the New York Legislature in 1860, but entered the army as colonel of the 27th New York volunteers at the beginning of the Civil War. He was severely wounded at the First Battle of Bull Run, where he rendered valued service and was promoted to be brigadier general soon after.

After rendering efficient service in the Peninsular Campaign, he was made major general of volunteers, and as such commanded in the Second Battle of Bull Run, at South Mountain, and at Antietam. In the spring of 1863 he participated in the battles of Chancellorsville, Fredericksburg, and Gettysburg, and in 1864 was conspicuous as a leader in the Southwest. He commanded the left wing of Sherman's army while marching to the sea and through the Carolinas, and participated at the surrender of General Johnston. In 1868 he entered Congress as a Democrat from the State of New York. He was reëlected in 1870 and 1884, serving on the floor of the House as an efficient and influential representative. He was president of the board of civic works from 1876 to 1878. Slocum served

as one of the commissioners of the Brooklyn bridge.

SLOE (slō), or **Blackthorn,** a shrub of the plum family, usually growing to a height of from six to twelve feet. The wood is hard and

SLOE.
Flower and Fruit.

tough and the young growth is used for walking sticks. The flowers are white, preceding the leaves in the spring, and it is regarded by many as the original of the common garden plum. A species known as the *common sloe* is abundant in Europe, whence it has been brought to the New England states. The fruit is about the size of a large pea. It has a bitter taste and is sometimes used in making a wine and for preserves. The leaves have a greenish appearance, resembling tea, and are used to some extent in adulterating that commodity. The wood is hard and dark colored, takes a fine polish, and is used in making flails, handles to tools, and teeth to rakes.

SLOTH (slŏth), a genus of mammals which belong to the bear family. They are native to Central and South America. These animals are peculiar for their long claws, which turn toward the body, thus making it difficult to move on the ground, but they pass to and fro with remarkable facility on the limbs of trees. They live almost entirely among the upper limbs of the larger trees in the tropical regions, where they are enabled to pass quite easily from one tree to another, which they do by clinging to the branches with their claws while the body is suspended beneath. The lips are long and extensile, thus enabling them to secure the insects, honey, fruits, and tender shoots of trees on which they feed. They are covered with coarse, shaggy hair, quite like withered grass, which protects them from insects and shields them from observation when at rest in the daytime. The tail is very short. The female produces one young at a birth, which clings to its mother until it is able to provide for itself. Flesh eating animals and snakes are its enemies, but it protects itself against the former by climbing on the branches of trees and against the latter by using its powerful claws. Several species have been described by naturalists, the best known being the *ai,* or *three-toed sloth,* and the *unau,* or *two-toed sloth.* Both these species have a plaintive cry.

SLOT MACHINE, a mechanical device designed to facilitate the sale of some commodities, usually small articles of confection. Machines of this kind are not of modern origin, but their use prior to 1880 was quite limited. At present many kinds of slot machines are in use, including those designed to facilitate the sale of chewing gum, cigars, and perfume. Some are designed to provide entertainment, such as phonographic machines and weighing machines. The last named have thus far proven most profitable, the reason being that there is no outlay for wares sold and the machine is a durable structure. Next to them in the way of profit are the gum-selling machines, the outlay in these being small and the profit comparatively large.

These machines are so called from a slot into which a penny, nickel, or some other small coin is dropped by the patron, without which the machine cannot be operated. Most of the slot machines are stationed in hotels, railroad stations, and other public places, where they are patronized by the public, all the accounts being kept by an automatic mechanism in the machines. In some cases the slot machine has given rise to a form of gambling, in which kind the patron deposits a small coin, as a five or ten cent piece, expecting to receive in return a larger amount of money. The use of these machines is forbidden in some cities by ordinance.

SLOVAKS (slō-văks'), the name of a Slavic people of Europe, occupying the eastern part of Czecho-Slovakia. In language and traditions they are closely related to the Czechs, but a large number of them use the German language. In the 9th century they were a powerful part of the empire of Moravia, but later were subjugated by the Magyars. Many dialects are spoken by these people, but the writers, such as Holly and Kollar, preferred to use the German or the Bohemian tongues. In religion they are largely Roman Catholic. The number of Slovaks is estimated at about 2,000,000.

SLOVENIANS (slō-vē'nĭ-ạnz), a branch of the Slavic people in the southern part of Jugo-Slavia. They reside chiefly in Carniola, Styria, and Carinthia. In habits and manners they are closely allied to the Servians. They number about 1,500,000.

SLOYD, the name of a system of manual training, called *slojd* by the Swedes, meaning skill or dexterity. It was originated in the past century, but its popularity dates from 1876, when Otto Solomon, president of the normal school at Naas, induced a greater interest in its higher and general development. Originally it trained in the manufacture of wooden household utensils, but now includes mechanical drawing and the use of complicated tools. The aim is to fit the student for practical lines in the industries, and especially to train for the employment of

knowledge gained in school as a means of aiding in the work to be done. The Sloyd system has been adopted in a more or less modified form in many countries of Europe and America.

SLUG, the common name of a genus of mollusks, differing from the snail in having only a rudimentary cell. The form is elongated and more or less concealed by a mantle. On the head are four tentacles or feelers that can be drawn back. These tentacles consist of two pairs, a short and a long, and on the tips of the longer pair are the eyes. The slugs become dormant in frosts, taking shelter under clods and vegetable forms. Slugs often frequent trees in search of decaying vegetable matter, on which they feed, and in some places they ravage the fields of growing crops during moist weather. A large number of species have been studied, the best known being the gray, great gray, red, and black slugs. They are distributed in many lands and most species are preyed on by mammals and birds.

SMALL ARMS. See **Arms.**

SMALLPOX, or **Variola,** a contagious disease, resulting from a specific morbid poison and passing through several stages. Contagion is the only known origin of smallpox. It is thought to be the most contagious of diseases. The period of incubation after exposure is believed to be from ten to fourteen days, but in cases of direct inoculation of the virus the time is much shorter. A high, inflammatory fever is the first manifestation of the disease. It is followed after three to five days by eruptions, which at first feel like small shot under the skin, but finally develop into serous infiltrations, called *vesicles.* The vesicles gradually increase in breadth, forming pustules, and by about the eighth day they break open. Shortly after they become covered by scabs. The number of pustules depends largely on the severity of the disease, ranging from only a few to many thousands. About the twenty-first day the scabs are completely gone, leaving blotches of a reddish-brown color for several months, and in many cases they become permanent pits in consequence of ulceration of the true skin. Vaccination is ordinarily a preventive, though not absolutely proof against it, but it has been found that persons vaccinated rarely have an aggravated form of the disease. About 50 per cent. of the persons afflicted with smallpox in former times died of the disease, but vaccination and enlarged skill in medical practice have lessened mortality to a remarkable extent.

SMEATON (smē'tŭn), **John,** civil engineer, born near Leeds, England, June 8, 1724; died Oct. 28, 1792. He was the son of an attorney and gave early evidence of interest in mechanical pursuits. In 1750 he removed to London, where he devoted himself to inventions, and the following year produced a machine for measuring a ship's path at sea and an improved form of the compass. He was made a member of the Royal Society in 1753 and two years later was intrusted with rebuilding the Eddystone Lighthouse, which, on completion in 1759, secured him the Copley medal. The lighthouse constructed by him remained intact until 1882, a period of 123 years, when a new structure took its place. Other notable works supervised by him include the Spurn Lighthouse, the Forthand Clyde Canal, the Perth and Banff bridges in Scotland, and extensive improvements in the Ramsgate harbor. He published a report and description of the Eddystone Lighthouse.

SMELL. See **Nose.**

SMELT, a genus of fish of the salmon family, but differing from the salmon in having conical teeth on the jaws and tongue and on the tips of the vomer. Several species have been enumerated by writers. They are widely distributed, the American smelt being a common fish from New York to the northern coast of America. It has a greenish back and small scales and is about eight inches long. It is valued highly as a food fish. The smelt ascends the rivers in the spring to spawn and in the summer returns to the ocean, but in some cases becomes land-locked in the lakes. The smelts of Western Europe are somewhat smaller than the American species, but they are equally favored as food fishes. They abound in the North Sea and the Atlantic as far north as Norway. The flavor is best in the species frequenting the ocean at least part of each year.

SMET, Peter John de, missionary, born at Termonde, Belgium, Dec. 31, 1801; died May 23, 1872. He studied at the Seminary of Mecklin, a Roman Catholic institution, and in 1821 came to the United States. In 1828 he settled in Saint Louis, Mo., where he aided in founding the University of Saint Louis. He took up missionary work among the Pottawatomie Indians in 1838, and two years later established a mission among the Flatheads in the Rocky mountains. He translated a number of works into the native tongue, published several valuable reports, and interceded for the Indians in several disputes.

SMETANA (smĕ-tä'nä), **Friedrich,** composer, born in Leitomischl, Bohemia, in 1824; died in 1884. He studied under Liszt and other composers and founded a school of music in Prague. In 1856 he became conductor of concerts at Gothenburg, Sweden, and ten years later was made director of the national theater at Prague. He is the author of quartets and symphonies, but excessive work caused him to lose his mind. His chief productions are "The Bartered Bride," "Hakon Jarl," and "Wallenstein's Lager."

SMILAX (smī'lăks), a genus of plants belonging to the lily family. It includes about 200 species, of which the greater number are climbing and trailing plants. They are widely distributed in the temperate and tropical part of both hemispheres and include species that are useful in medicine and as food. About a dozen species are native to North America, including the greenbrier and carrion flower. Sarsaparilla

(q. v.) is obtained from the rootstock of the smilax. A plant cultivated and known as smilax is a species of asparagus.

SMILES, Samuel, noted author, born at Haddington, Scotland, in 1812; died April 17, 1904. After completing a medical course in the University of Edinburgh, he established a practice in his native town, but later abandoned medicine to become editor of the Leeds *Times*. He became connected as secretary with the Leeds and Thirsk Railroad in 1845, and at intervals published a number of miscellaneous writings. His best known work is a treatise on self-culture, entitled "Self-Help," which appeared in 1859 and has been translated into about twenty different languages. Another work of wide repute is his "Life of George Stephenson," which resulted from forming the acquaintance of that noted engineer at Leeds in 1857. Smiles was granted a law degree by the University of Edinburgh in 1878. Among his works not mentioned above are "Life and Labor," "Brief Biographies," "Men of Invention and Industry," "Lives of Boulton and Watt," "Lives of Engineers," "Huguenots in France and England," and "A Publisher and His Friends."

SMITH, Adam, eminent writer on economical and moral science, born at Kirkcaldy, Scotland, June 5, 1723; died in Edinburgh, July 17, 1790. He descended from a respectable family, his father being Adam Smith, controller of the customs at the port of Kirkcaldy. After studying at Glasgow and Oxford, he was made professor in the University of Glasgow, where he held the chair of logic and later of moral science. In 1759 he published his "Theory of Moral Sentiments," a work most favorably received and widely read. He accompanied the Duke of Buccleugh on extensive travels in 1764 and, before returning to Scotland, spent nearly a year in Paris, where he met a number of eminent philosophers famous in the time of Louis XV. Shortly after he settled at Kirkcaldy, where he spent about ten years in preparing the material for his great work entitled "Inquiry Into the Nature and Causes of the Wealth of Nations," a production that marks an epoch in economical study and has been widely translated. It has been quoted as authoritative by many writers on economics. He was made lord rector of Glasgow University in 1787.

SMITH, Alexander, poet, born at Kilmarnock, Scotland, Dec. 31, 1830; died Jan. 5, 1867. He became a designer in a lace factory at Glasgow and while working began to take an interest in poetry. In 1853 he became well known by publishing "A Life Drama" and was soon after made president of the University of Edinburgh. Several of his books were published in conjunction with Sydney Doebell, with whom he was classed as a member of the Spasmodic School. His chief works include "Sonnets of the Crimean War," "A Summer in Skye," and "The City Poems."

SMITH, Alfred Emanuel, public man, born at New York City, Dec. 30, 1873. He attended parochial schools and graduated at Manhattan College and Fordham University. His father was a truck-driver in New York City, where the son worked both with his father and in the Fulton Fish Market.

The public career of Smith began in 1903, when he was elected to the State legislature, where he served consecutively for 12 years. In 1911 he became the leader of the Democrats in the legislature, two years later was chosen speaker, and in 1915 served as a delegate to the State Constitutional Convention. Withdrawing temporarily from State politics, he was elected sheriff of New York County, serving two years, and in 1917 became president of the board of aldermen in New York City. He was elected Governor in 1918, was defeated in 1920, but was again elected Governor in 1922. Smith was an opponent of President Wilson in many party issues. He signed the bill that repealed the Mullan-Gage Enforcement Law, which has reference to the enforcement of prohibition under State activities. He was re-elected Governor in 1924 and 1926. In 1928 the national Democratic convention at Houston, Texas, accorded him a marked ovation and nominated him for President of the United States with nearly a unanimous vote.

SMITH, Andrew Heermance, physician, born in Charlton, N. Y., Aug. 27, 1837. He studied at the College of Physicians and Surgeons, New York City, and later at the universities of Berlin and Göttingen, Germany. He contributed to our knowledge of pneumonia and suggested the medical uses of oxygen. In 1890 he was a delegate to the International Medical Congress at Berlin.

SMITH, Andrew Jackson, soldier, born in Berks County, Pennsylvania, April 28, 1815; died Jan. 30, 1897. He graduated from the West Point Military Academy in 1838 and served in the Mexican War. In 1864 he was commissioned major-general and as such participated in the Battle of Nashville. Subsequent to the war he resided in Saint Louis, Mo., where he was appointed postmaster in 1869.

SMITH, Charles Emory, journalist and statesman, born in Mansfield, Conn., Feb. 18, 1842; died Jan. 19, 1908. He attended the Albany Academy and Union College in New York. He served in the Civil War and was editor of the Albany *Express* and later of the Albany *Evening Journal*. President McKinley appointed him Postmaster General in 1898, after the resignation of James A. Gary. He continued a member of the Cabinet after the succession of Roosevelt to the Presidency, but retired in 1902.

SMITH, David Eugene, educator, born in Cortland, N. Y., Jan. 21, 1860. In 1898 he became principal of the New York State Normal School. He was made professor of

MR. AND MRS. ALFRED EMANUEL SMITH

Mr. Smith is one of the most prominent public men of the United States, serving as Governor of New York four terms, and in 1928 was nominated for President by the Democratic party.

(Opp. 2656)

mathematics in Columbia University in 1901, and became known as a lecturer in the Harvard University and for societies promoting summer courses. He published a number of text-books on elementary mathematics, edited the *Bulletin of the American Mathematical Society*, and contributed to the *New International Encyclopaedia*. He and W. W. Beman translated Fink's "History of Mathematics" and Klein's "Famous Problems of Geometry."

SMITH, Edmund Kirby, soldier, born in Saint Augustine, Fla., May 16, 1824; died March 28, 1893. After graduating at the West Point Military Academy, in 1845, he became a teacher and instructed as assistant professor of mathematics at West Point from 1849 to 1852. He was made a major in the United States army in January, 1861, but on the secession of Florida resigned his commission and joined the Confederate army. Efficient service caused his promotion to the rank of lieutenant general in 1862 and the following year to that of general. He took part in the First Battle of Bull Run in 1861 and afterward fought at Richmond, Perryville, and Murfreesboro. In 1863 he was given command of the trans-Mississippi department, where he organized a government and established factories for supplying the troops with munitions of war. The following year he opposed and defeated Banks in the Red River campaign. His army was the last to surrender. He served as president of the Atlantic and Pacific Telegraph Company from 1866 to 1868, was chancellor of the University of Nashville from 1870 to 1875, and subsequently became professor of mathematics in the University of the South, at Sewanee, Tenn., where his death occurred.

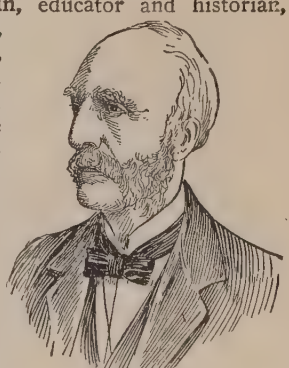
SMITH, Eli, missionary, born in Northford, Conn., Sept. 13, 1801; died in Beyrout, Syria, Jan. 11, 1857. He was educated at Yale University and Andover Theological School, graduating from the latter in 1826. The following year he sailed to Malta as missionary of the American Board and had charge of the printing office while superintending his charge. After traveling as a missionary in Syria, Greece, and Armenia, he settled at Beyrout, in 1833, where he made a study of several Eastern languages and assisted in explorations of Palestine. In 1839 he went to Leipsic, Germany, to have cast an improved font of Arabic type, a work that proved of vast importance in revising the printed form of Arabic. The last ten years of his life were spent with Cornelius Van Dyke in translating the Bible into the Arabic language. He published "Missionary Researches in Armenia." His wife, Sarah Lanman Smith (1802-1836), accompanied him and rendered valuable assistance in his missionary work.

SMITH, Francis Hopkinson, artist and author, born in Baltimore, Md., Oct. 23, 1838. He received a good education and studied engineering, and for some time had employment as an engineer in building public works. Some of his construction work was done under contracts with the United States government. As an artist he produced a number of excellent paintings, among them "In the North Woods," "In the Darkling Woods," and "A January Thaw." His writings include "Well-Worn Roads," "Colonel Carter of Cartersville," "Book of the Tile Club," "Tom Grogan," and "Old Lines in New Black and White." He died April 7, 1915.

SMITH, George Adam, theologian, born in Calcutta, India, Oct. 19, 1856. He studied at the University of Edinburgh and at New College, and subsequently took courses at the universities of Leipsic and Tübingen. Shortly after receiving his degree, he traveled extensively in Egypt and Western Asia and served as instructor in Hebrew at the Free Church College of Aberdeen, from 1880 until 1882. In the latter year he was made pastor of the New Church at Edinburgh, serving until 1892, when he was chosen professor of Hebrew in the Free Church College of Glasgow. He visited America in 1903 and lectured extensively, including several lectures at the Union Theological Seminary. His "Historical Geography of the Holy Land" was published in 1901. Among his numerous writings are "Commentary on Isaiah," "Preaching of the Old Testament to the Age," "Life of Henry Drummond," "Commentary on the Twelve Prophets," and "Historical Atlas of the Holy Land."

SMITH, Gerrit, capitalist, born at Utica, N. Y., March 6, 1797; died Dec. 28, 1874. He studied at Hamilton College and settled at Petersboro, N. Y., as manager of his large landed estate inherited from his father, Peter Smith, who was associated in the fur trade with John Jacob Astor. In 1852 he was elected to Congress, but refused to accept a reëlection. He supported the Free-Soil party, gave financial aid to John Brown, and was for several years Governor of New York. In 1867 he joined Horace Greeley in signing the bail bond of Jefferson Davis. He published "Speeches in Congress," "Sermons and Speeches," and "The Religion of Reason."

SMITH, Goldwin, educator and historian, born in Reading, England, Aug. 13, 1823. He studied at Eton and Oxford, and in 1847 became a fellow of University College. As secretary of the Oxford University Commission he compiled the government *Blue Book* on education in 1858, and in the same year became professor of modern history at that university, holding the position until 1866. He was a prominent champion of the Union cause in



GOLDWIN SMITH.

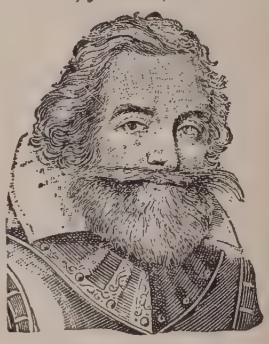
the American Civil War and visited the United States in 1864. On returning to England he published "England and America" and "Civil War in America," two works highly favorable to the North, and in 1868 resigned his chair at Oxford to become professor of English and history in Cornell College at Ithaca, N. Y. In 1871 he removed to Canada and at different times edited the *Canadian Monthly, The Bystander,* and *The Week.* His writings include "Lectures on the Study of History," "Irish History and Character," "Essays on Questions of the Day," "Oxford and Her Colleges," "Specimens of Greek Tragedy," "Guesses at the Riddle of Existence," and "Political History of England." He died June 7, 1910.

SMITH, Henry Boynton, clergyman, born in Portland, Me., Nov. 21, 1815; died in New York City, Feb. 7, 1877. He graduated from Bowdoin College in 1834, studied theology at Andover and Bangor theological seminaries, and later attended the German universities of Halle and Berlin. From 1842 to 1847 he officiated as clergyman in the Congregational Church at West Amesbury, Mass., and in the latter year became professor of mental and moral philosophy at Amherst College. He was chosen to the chair of church history of Union Theological Seminary in New York City, in 1850, and four years later became professor of systematic theology in the same institution, a position he held for twenty years. He founded the *American Theological Review* in 1859, the *Presbyterian Review* in 1862, and the *Princeton Review* in 1871. Among his writings are "Introduction to Christian Theology," "History of the Church of Christ in Chronological Tables," and "System of Christian Theology." He edited Hagenback's "History of Christian Doctrine," Gieseler's "Church History," and Stier's "Words of the Lord Jesus."

SMITH, Hoke, public man, born in Newton, N. C., Sept. 2, 1855. He studied at home under private tutors and in 1872 removed to Georgia, where he taught school a number of years. Later he was admitted to the bar and practiced law in Atlanta. From 1887 to 1898 he was editor of the Atlanta *Journal.* President Cleveland made him Secretary of the Interior in 1893, in which position he served until 1896, when he resigned and became an active supporter of Bryan for the Presidency. Subsequently he practiced law and in 1906 was elected Governor of Georgia, being an advocate of reform in government and in the regulation of railroads. In 1907 he signed the prohibitory liquor law enacted by the Legislature.

HOKE SMITH.

SMITH, John, eminent explorer and founder of Virginia, born in Willoughby, England, in January, 1579; died in London, June 21, 1632. He was the eldest son of a tenant farmer named George Smith, attended the free schools of Alford and Louth, and in 1595 ran away from home to spend ten years of adventure in Europe, Asia, and Africa. His first travels were in France and Holland, but he soon entered the military service and was connected with a number of leaders. After fighting against the Turks in Hungary, he became connected with a piratical ship on the Mediterranean, but again entered the military service, taking a prominent part under the Duke of Austria against the Turks. The latter took him a prisoner and sold him into slavery, but he soon escaped and made an extensive tour through Germany and other European countries, and, after traveling in Morocco, returned to England in 1605. In the same year he joined an expedition to explore and colonize Virginia, the expedition consisting of three vessels, 140 colonists, and forty sailors. It reached the West Indies on March 24, 1607, and, after sailing northward, became lost in the sea, but was fortunately driven by a gale into the mouth of Chesapeake Bay. The mouth of the James River was reached on April 26, 1607, and, after exploring the stream, the company selected a site for their capital, which they named Jamestown.



JOHN SMITH.

Smith had been charged with wanting to establish a kingdom in Virginia with himself as sovereign while the expedition was still *en route,* but after trial was acquitted and became the most active and important member of the new colony. He made a number of important explorations. While in the Chickahominy region he was taken prisoner by Powhatan, but was saved from execution by Pocahontas, daughter of the famous Indian chief. On returning to Jamestown he found the colonists reduced to about forty members, all of whom were anxious to return to England, many of them being illy fitted to battle against the hardships of pioneer life. Smith succeeded in inducing them to await the arrival of other colonists from England, and in 1608 made extensive explorations of Chesapeake Bay and the country surrounding it, of which he prepared a map of value to later settlers. In the spring of 1609 he was severely wounded by the accidental discharge of a quantity of powder, and soon after was obliged to return to England for

treatment, being succeeded as governor of the colony by Lord Delaware.

Smith never visited Virginia again, but in 1610-17 he made extensive explorations in the regions now occupied by New England and Southeastern Canada, his primary object being to fish for cod and establish the fur trade, but in 1615 and 1617 he made two unsuccessful attempts to found settlements. The last thirteen years of his life were spent in writing accounts of his travels. He was buried in Saint Sepulchre's Church, London. Among his writings are "Observations of Captain John Smith," "General History of Virginia," "Description of New England," "Map of Virginia," "New England and the Summer Isles," "True Travels," and "A True Relation of such Occurrences and Accidents of Note as hath happened in Virginia."

SMITH, Joseph, the founder of the Mormon Church, born in Sharon, Vt., Dec. 23, 1805; died June 27, 1844. His parents removed to Palmyra, N. Y., where he was impressed by the disagreement among the religious denominations. In 1827 he announced that he had received a vision in regard to a sacred book that he claimed was buried near Manchester, and later he received a volume that is alleged to be the Book of Mormon. He gathered a few followers and removed to Kirtland, Ohio, in 1831, where he failed in the management of his community and a storehouse. Soon after he founded the city and temple of Zion near Independence, Mo., and succeeded in attracting a large following. In 1844 he was a candidate for President of the United States, was mayor of Nauvoo, Ill., and became complicated in legal controversies. He was arrested under a writ of treason but was not tried in court. Feeling ran against him to such an extent that he was taken from the jail in Carthage and was shot by a mob. See **Mormons.**

SMITH, Samuel Francis, clergyman and author, born in Boston, Mass., Oct. 21, 1808; died there Nov. 16, 1895. After graduating from Harvard University and Andover Theological Seminary, he became a pastor of the Baptist Church, securing the charge in Waterville, Me., in 1832. He was professor of modern languages in that city from 1834 until 1842 and in the latter year removed to Newton, Mass., where he published the *Christian Review.* He visited the chief mission stations of Asia in 1875 and again in 1880, remaining abroad for several years. Smith is the author of a large number of well-known hymns, many of them being used in Baptist and other hymn books. The best known is "My Country, 'Tis of Thee," the national anthem, which was written in 1832 while he was a student at Andover. A brilliant reception was given to him in Music Hall, Boston, on April 3, 1895, when the national anthem and other hymns from his pen were sung. "The Morning Light Is Breaking," a favorite missionary hymn, was written by him in 1832. His hymns were published under the titles, "Lyric Gems," "Rock of Ages," and "The Psalmist."

SMITH, Sydney, author, born in Essex, England, June 3, 1771; died in London, Feb. 22, 1845. He studied at the Winchester School and Oxford University and soon after became clergyman of Amesbury, in Wiltshire. A member of his congregation selected him to accompany his son as tutor to the University of Weimar, Germany, but that country became the seat of a prolonged war and he proceeded to Edinburgh, where he served as clergyman in the Episcopal chapel. In 1802 he joined several others in establishing the *Edinburgh Review,* a periodical that marks an epoch in the literary and independent criticism of Scotland.

He removed to London in 1803, where he attained a wide acquaintance as a fine pulpit orator and lecturer on moral philosophy. Later he filled other charges, among them those at Foston-le-Clay, in Yorkshire, and Combe-Florey, in Somerset, and in 1831 was given a prebendary at Saint Paul's Church, London. His writings include chiefly religious and political works, through which run a vein of pleasantry and truth. A large number of his contributions to the *Edinburgh Review* were collected and republished in 1839. Other writings from his pen embrace "Peter Plymley's Letters," "Speeches on the Catholic Claims and Reform Bill," "Letters on Railways," "Letters on American Debts," "The Ballot," and "Letter to Lord John Russell on the Church Bills." "Peter Plymley's Letters" was written in favor of Catholic emancipation, while "Letters on American Debts" treats of the repudiation of debts by the State of Pennsylvania. It appeared in 1843.

SMITH, William, geologist, born at Churchill, England, March 23, 1769; died Aug. 28, 1839. He studied to become a civil engineer and, while practicing that profession, took up the study of soils and rocks. During this time he made a number of maps showing the order of succession in the geological strata. His geological map of England and Wales required about fifteen years, which he afterward supplemented with separate maps of the counties. This work comprises the first map of the kind to be issued of England. He was granted a pension by the government in recognition of his service to science, and several medals were bestowed upon him. He is generally regarded as the "Father of English Geology."

SMITH, William Farrar, soldier, born at Saint Albans, Vt., Feb. 17, 1824; died in 1903. He graduated at the United States Military Academy in 1845, where he was made an instructor in mathematics. In 1861 he took part in the First Battle of Bull Run. He served in the defenses of Washington, in the Peninsula campaign, and in the battles of South Mountain and Antietam. In the meantime he was made major general of volunteers and as such commanded at Fredericksburg. In 1863 he became

chief engineer of the department of the Cumberland and later of the Mississippi, and in 1865 resigned as major of volunteers and was commissioned major general in the regular army. Subsequently he was police commissioner of New York City and by act of Congress was reappointed major in the army, but retired in 1889.

SMITH, William Robertson, theologian and Orientalist, born in Keig, Scotland, Nov. 8, 1846; died in Cambridge, March 31, 1894. His father was a Free Church minister, under whose care he received his early education, and afterward attended the University of Aberdeen. Subsequently he studied theology at Bonn and Göttingen, Germany, and in 1870 became professor of Hebrew in the Free Church College of Aberdeen, but was later suspended for rejecting the Mosaic authorship of the Book of Deuteronomy. During his suspension he traveled in Egypt and Arabia and was afterward dismissed. Subsequently he lectured on various subjects relating to theology and Bible history, and in 1881 became an associate editor of the *Encyclopaedia Britannica,* but on the death of T. Spencer Daynes, in 1887, was made editor in chief. Smith was an able writer and lecturer and a fearless investigator of complicated questions. Among his published works are "The Prophets of Israel and Their Place in History," "Old Testament in the Jewish Church," "Kinship and Marriage in Early Arabia," and "Religion of the Semites."

SMITH, Sir William Sidney, admiral and hero of Acre, born at Westminster, England, July 21, 1764; died in Paris, France, May 26, 1840. He was the second son of John Smith, captain of the guards, and at the age of eleven years entered the navy to participate in the American war. His courage displayed in an engagement off Cape Saint Vincent, in 1780, caused him to be made lieutenant on the *Alcide,* and in 1782 he became captain and was given command of the sloop *Fury.* From 1790 to 1792 he aided the King of Sweden against Russia, was sent on a mission to Constantinople the following year, and soon after joined Lord Hood in destroying the French ships and arsenal at Toulon. The French took him prisoner at Havre de Grace in 1796 and sent him to Paris, but he made his escape two years later and returned to England. He was soon after sent as minister to Constantinople. While there he learned that Napoleon designed an attack on Saint Jean d'Acre and hastened to its relief. After capturing a number of French vessels on March 16, 1799, he successfully defended the town and obliged Napoleon to raise the siege and retreat in disorder. This brilliant exploit won him the thanks of Parliament and a pension of £1,000. He was elected to Parliament in 1802 from Rochester, served with distinction in Sicily and Naples in 1805, and was promoted to the rank of admiral in 1821. The later years of his life were spent at the French capital.

SMITH COLLEGE, an educational institution at Northampton, Mass., founded in 1871 to promote the higher education of women. It is so named from Sophia Smith, who founded the institution and made a bequest to it of $400,000. Students who complete the undergraduate courses receive the degree of bachelor of arts, and more advanced study entitles them to the degrees of M. A. and Ph. D. Among the chief buildings are the College Hall, the Lilly Hall of Science, the Music Hall, the Chemistry Hall, and the Hillyer Art Gallery. The grounds and buildings are valued at $6,000,000. About 210 professors and instructors are employed and the institution is attended by 2,100 students.

SMITH'S FALLS, a city of Ontario, in the counties of Greenville, Lanark, and Leeds, 40 miles southwest of Ottawa. It is on the Canadian National and the Canadian Pacific railroads and is surrounded by a fertile farming country. Among the principal buildings are the high school, the Rideau Hotel, and several fine churches. The manufactures include brick, clothing, stoves, flour, woolen goods, and machinery. Power is obtained from the Rideau River. It has electric lighting and municipal waterworks. Population, 1901, 5,155; in 1921, 6,790.

SMITHFIELD, a six-acre tract of land in London, England, lying north of Newgate and west of Aldersgate. It was an open spot and was used for strolling in the early part of the 12th century, but in 1150 was converted into a stock and hay market, for which it was used until 1855. Smithfield served as the seat of the Bartholomew Fair and as the place of execution of English martyrs between the years 1401 and 1612. Charles Dickens mentions it in his "Oliver Twist." The greater part of it is occupied at present by gardens, seats, paths, and drinking fountains, but a small portion of it is still used as a hay market. Several railways cross it.

SMITHSON (smĭth'sŭn), **James,** scientist, born in France about 1765; died June 27, 1829. He was a son of Hugh Smithson, the first Duke of Northumberland, and was educated at Pembroke and Oxford. In 1787 he was made a fellow of the Capital Royal Society and devoted himself largely to the fields of chemistry and mineralogy. His life was spent chiefly in Paris, but he died in Genoa, Italy. His fortune of $515,000 was left to his nephew, Henry James Hungerford, and it was stipulated in the will that, if the legatee should die without issue, the entire amount should be used to found an institution at Washington, D. C., whose purpose is to be for "the increase and diffusion of knowledge among men." Since Hungerford died childless, the bequest was transferred to the United States. See **Smithsonian Institution.**

SMITHSONIAN INSTITUTION (smĭth-sō'nĭ-ạn), a scientific institution in Washington, D. C., established by act of Congress in 1846. This institution owes its origin to James Smithson, son of the third Duke of Northumberland, who, by the terms of his will,

gave an estate worth $515,169 to the United States government "to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men."

Congress accepted the bequest in 1836 and it has been enlarged by subsequent additions to about $1,250,500, which amount is held as a deposit in the United States treasury. This fund yields an income of about 6 per cent. The institution is governed by a board of regents composed of the Chief Justice of the United States, three representatives appointed by the speaker of the House, three senators appointed by the Vice President of the United States, and six citizens chosen by Congress. The general management is largely under the direction of the secretary. It has splendid buildings of Seneca brownstone, which are located in the south part of the Mall, a short distance east of Washington's monument.

The institution has the Bureau of Ethnology, the Bureau of Publications, the Astrophysical Observatory, the Bureau of Research, the National Museum, and the National Zoölogical Park. The last two mentioned are supported entirely by congressional appropriations. The National Zoölogical Park occupies a tract of 170 acres in Rock Creek Valley, near Washington. Three series of publications are issued under the direction of the secretary, known as the *Smithsonian Annual Reports, Smithsonian Contributions to Knowledge,* and *Smithsonian Miscellaneous Collections.* The Smithsonian Library has 115,000 volumes, but pamphlets, periodicals, and maps bring the aggregate up to about 160,000 pieces. Most of this collection is at present accommodated in the congressional library building. The secretaries of this institution include Joseph Henry, S. F. Baird, S. P. Langley, and Charles D. Walcott.

SMOKE, the volatile vapor arising from the combustion of any organic matter, as wood or coal. The term is applied in a more limited sense to the visible vapor arising from a burning substance, but, besides this, invisible gaseous matter escapes. Burning wood gives off an almost invisible smoke, consisting of water and carbonic acid, but the smoke arising from burning coal is darkened by the presence of soot, oily vapor, and fine particles of carbon. It has long been a problem how to overcome the evils of dense smoke in large manufacturing centers, especially where great quantities of bituminous coal and crude oil are consumed. Experience has shown that if the black smoke, which escapes from a furnace when a quantity of cold coal is thrown in upon an incandescent mass, can be made to pass over another portion of coal in active combustion, this carbon is consumed; that is, it is combined with atmospheric oxygen and converted into carbonic oxide, which burns, producing carbonic acid, and therefore eventually escapes as colorless vapor.

Any process that tends to increase the flame of burning material diminishes the volume of visible smoke. This is due to the fact that combustion becomes more perfect by providing a larger amount of oxygen, which can be done only by inducing an adequate draught of atmospheric air. A high degree of efficiency is secured in many American manufacturing centers using natural petroleum, where a jet of heated steam is blown into the hot combustion chamber and the oil and air enter and mix with it. Many experts argue in favor of first converting the coal into gas, as we secure a smokeless fuel in the gas, while the coke produced during the preparation of the gas has many uses, especially as a solid fuel. Pittsburg has made remarkable progress in overcoming the evils of smoke from factories by using large quantities of natural gas, which produces no visible smoke and leaves no cinders. While that city was formerly quite dirty, it is now one of the cleanest manufacturing centers in the world.

SMOKELESS POWDER, an explosive that acts without the production of much smoke, used chiefly for military purposes. About 50 per cent. of ordinary gunpowder is made up of finely divided solids, but smokeless powders develop wholly gaseous products in the course of combustion. Besides being partly or entirely smokeless, these powders are more valuable than black gunpowder because they impart to projectiles higher velocities. They are prepared by the dissolution of gun cotton and nitrocellulose in ether, after which the compound is dried into a hornlike substance. The nitrocellulose used in this process of manufacture is prepared by soaking wood pulp or sawdust in a solution of nitric acid, or nitric and sulphuric acids. When fully hardened by drying, the product is prepared for use by separating into flakes or grains by machines. In some varieties cellulose nitrate is mixed with nitroglycerin, or with nitro derivatives of hydrocarbons, such as picric acid. The ingredients depend upon the maximum initial velocity desired. See **Gunpowder.**

SMOLENSK (smȧ-lyĕnsk'), a city of Russia, capital of the government of Smolensk, on the Dnieper, 260 miles southwest of Moscow. It is surrounded by massive walls, but they are not maintained in a good condition for defense. The principal buildings include the Cathedral of Uspenski, the museum, the public library, the episcopal palace, and a number of educational and industrial institutions. It has railroad facilities and a large trade. The manufactures include soap, leather, linen textiles, carpets, and machinery. The place was a part of Poland until 1654, when it was annexed to Russia. It was the scene of a battle between the French and Russians in 1812. Population, 1922, 51,982.

SMOLLETT (smŏl'lĕt), **Tobias George,** historian and novelist, born in Dalquhurn, Scotland, in 1721; died near Leghorn, Italy, Oct. 21, 1771. He descended from a distinguished Scotch family, studied at the University of Glasgow,

and was afterward apprenticed to a surgeon in that city. It was his early intention to practice the profession of medicine, but his medical study gave way to interest in literature, and in 1740 he went to London to secure a publisher for a tragedy entitled "The Regicide." Failing in this, he became the mate of a surgeon on an expedition to Cartagena. This afforded an opportunity to study the varied life of a seaman, which served a useful purpose in preparing "The Adventures of Roderick Random," in 1748. He was editor of the *Critical Review* from 1756 to 1759, but was imprisoned for publishing criticisms on the government in relation to barbarities in Scotland and elsewhere. Smollett was a genial and humorous writer, his productions holding a large circle of readers and inducing translators to publish them in other tongues. His last years were spent at Monte Novo, near Leghorn, where ill-health had caused him to seek recuperation. He died there and, like Fielding, was buried in a foreign land. Among his numerous writings are "Peregrine Pickle," "Adventures of Ferdinand," "History of England," "A Tour in France and Italy," "Adventures of an Atom," "Tears of Scotland," and "Humphrey Clinker." He made a translation of "Don Quixote."

SMUGGLING (smŭg'glĭng), the offense of importing or exporting merchandise in violation of statutory law, especially without payment of duties required by the government. The practice obtained a wide foothold after the enactment of tariff duties by European countries, both on the continent and in Britain. Scott's "Red Gauntlet" and "Guy Mannering" are titles suggested by the peculiar arts practiced in bringing smuggled goods of various kinds into British possessions, the practice being quite extensive both in England and Ireland in the time of that author. In some countries smugglers were regarded as heroes, as was the case with the contrabandita of modern Spain. The British navigation laws and those intended to protect manufactures caused bold and extensive smuggling in the colonies, and many respectable business men of America regarded illicit trade with pirates and West India merchants justifiable. New York was the principal port for smugglers. That city and Philadelphia and Boston were enriched by the higher profits of illicit trading. It is estimated that goods to the value of $4,000,000 were smuggled into France under a high protective law in 1831.

The smuggling carried on at present in America is largely in articles of luxury, which are in many cases ingeniously concealed from the view of customhouse inspectors. It is not infrequent for persons landing on our shores to conceal articles of this kind in their hair, or by having them sewed in their clothes. In some regions there has been a considerable disposition to evade the payment of excise on spirits, which is quite common among the so-called *moonshiners* of the mountain regions in several southern states. The penalties for this class of smuggling are very severe. Some writers have suggested that free trade, or a very liberal tariff without any prohibitive rates, is the only remedy to entirely overcome the practice.

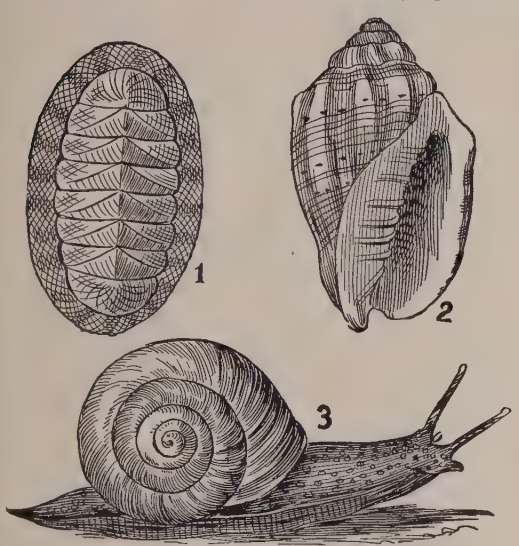
SMUT, or Dustbrand, the disease induced in higher plants by parasitic fungi. It is found frequently in the ears of corn, barley, oats, and rye, and sometimes in wheat. Smut usually appears as a black, sootlike powder, into which the grain and its integuments are converted. In some instances it affects various parts of the plant, especially in corn. When examined by a microscope, the black powder is found to consist of round spores, but these are so minute that many thousands of them can be placed on a square inch of surface. The smell is not disagreeable, as in some of the allied fungi. No remedy or preventive is known. Corn is infested by a remarkable kind, the ears and tassels sometimes assuming a very large size. It is thought advisable not to select seed corn from plants growing in the vicinity of infected stalks.

HEADS OF WHEAT.
Showing Healthy Head and Effects of Smut in Two Others.

SMYRNA (smĕr'nà), a seaport city in Asia Minor, on a gulf of the same name, now one of the largest cities in Asiatic Turkey. The Gulf of Smyrna, formerly the Hermaean Gulf, is an inlet of the Aegean Sea, on which the city has a secure harbor. Several productive islands are at its entrance and it extends inland about forty miles. The city is built partly on the plain at the shore of the gulf and partly on the gently sloping hills. The view of the city from the sea is remarkably attractive, but the visitor is disappointed in finding many illy constructed wooden buildings, filthy streets, and defective surface and sewer drainage. Railroad connection with the interior has tended to enlarge its export and import trade, though this has been of more or less importance from remote antiquity. The exports consist principally of opium, licorice, carpets, raisins, sponges, timber, tobacco, emery, olive oil, wool, cotton, silk, and live stock. Among the leading imports are glass, petroleum, paper, clothing, chemicals, and foodstuffs. It has manufactures of cotton and woolen goods, carpets, machinery, ironware, pottery, opium, and tobacco products.

Smyrna has many mosques, bazaars, churches, synagogues, hospitals, and government institutions, but none of them is of remarkable size or architecture. The city has separate quarters for the Turks, Armenians, and Jews, and the general population is very largely diversified, many nationalities being represented. It has several notable ruins of ancient temples, theaters, and walls. Smyrna is a very ancient city, its origin being lost in the traditions of antiquity. It claims the honor of being the birthplace of Homer and other great Grecians, but nothing definite is known beyond the 7th century, when it was occupied by Ionian exiles, who later joined it to the Ionian League. The Lydians destroyed it in 630 B. C., but it regained its importance under the Romans and for many years rivaled Byzantium. It was destroyed by an earthquake in 178 A. D., but Marcus Aurelius rebuilt it soon after. Tamerlane massacred its people, in 1402, and in 1424 it became a Turkish possession. At present the inhabitants include about 85,000 Turks, 42,000 Greeks, and 16,000 Jews. Population, 1922, 320,540.

SNAIL, a gasteropodous mollusk, differing from the slug in having a large, spiral shell. The species are very numerous, varying somewhat in habits and size, inhabiting practically all regions where fresh water is obtainable. They have four tentacles or feelers on the head, the two longer being provided with eyes, and all of them may be extended at will. The mouth has numerous rows of small teeth and is provided with a strong, horny upper mandible, while the tongue is broad and oblong. The body is soft and underneath is a foot or sole, the latter serving to facilitate its movement as it creeps along carrying the shell on its back. Snails are most active in warm, moist weather. They close their shell with a hardened mucus at the approach of winter, or in seasons of drought, and become inactive and torpid. When the shell and the soft parts are slightly injured, nature repairs them with remarkable completeness. In some places they effect considerable damage to garden vegetables and tender plants, on which they feed. The edible snail was a favorite article of food among the ancient Romans and is still eaten in France and other countries of Europe, where it is cultivated as a food commodity for the market. The largest snail native to America has a yellowish-white color and the shell has from four to six whorls. It is found commonly under logs or rocks, where it fixes itself to pass the winter.



MOLLUSKS.

1, Chiton; 2, Univalve; 3, Snail.

SNAKE RIVER, the largest tributary of the Columbia. It rises among the Rocky Mountains of western Wyoming and, after a general course toward the northwest, joins the Columbia a short distance north of Wallula, Wash. The Snake River forms a semicircle in flowing through southern Idaho and comprises part of the boundary line between Oregon and Idaho and between Washington and Idaho. Among the principal tributaries are the Salmon, Payette, Clearwater, Boise, and Owyhee rivers. The celebrated Shoshone Falls are on its course in southern Idaho and, after receiving the Salmon River, it forms the Salmon Falls. The entire length is about 900 miles, but only 160 miles are navigable.

SNAKEROOT, the name of several plants native to North America, so called from the belief that they are useful as remedies in treating snake bites. They are distributed in many parts of Canada and the United States. A species known as *Canada snakeroot* is found in New England and is known for its fragrance and tonic properties. *Black snakeroot,* or *sanicle,* has a root with an aromatic taste and properties of some value for antispasmodic purposes. *Seneca snakeroot* grows throughout most parts of the United States and from its root is prepared the drug known as *seneca.* It is an acrid irritant and is used by physicians in making cough mixtures in treating respiratory catarrhs.

SNAKES, or Serpents, an order of reptiles. They are characterized by an elongated body without limbs, terminating in a tapering tail. Writers estimate the number of species at from 1,500 to 1,800. The largest types and greatest number of species are common to the tropics, whence they gradually decrease until they entirely disappear in latitudes ranging from 40° to 55° south and north. They are especially abundant in the well-watered soil of the tropics, where the glades are open to the sun, and in these haunts may be found the largest species, such as the boas, pythons, and other types capable of devouring different forms of animals that frequent such regions. Arid districts are usually infested with vipers, rattlesnakes, and other

poisonous serpents, but these types are also widely distributed in sections having a moist soil and large vegetable forms.

Writers have enumerated five general classes of snakes. These include the burrowing, tree, ground, fresh-water, and sea snakes. The *burrowing snakes* live almost entirely under the surface. They feed chiefly on invertebrate animals and do not include poisonous types. *Tree snakes* pass most of their time on trees and embrace many poisonous species. Their bodies are usually green and slender, in some cases they are colored quite like the trees they inhabit, and their food is mostly insects and animals. *Ground snakes* rarely enter water or ascend trees, but they are seen quite often in burrows made by other animals. Most of them are not poisonous. *Fresh-water snakes* swim with great ease, are not poisonous, and feed on frogs, fish, and other forms of aquatic life. *Sea snakes* are generally poisonous, have a rudder-shaped tail, and are unable to move on land. Snakes of all kinds rarely proceed far from the place of their nativity, unless they are deprived of food and places to retreat for safety.

The body of snakes is covered with horny scales. Over the outside is a thin skin that is shed once each year and in some species even oftener. It first loosens at the head, and gradually peels off toward the tail, the skin being usually whole when cast oft. The number of ribs varies greatly, some having as many as 300 pairs. These serve to give form to the body, aid in respiration, and are the organs of locomotion. When moving forward, the animal assumes a winding shape and gains advantage by the lower ends of the ribs acting as feet, while the scales serve to hold to the surface and aid in drawing the different parts of the body. The eyes are small and unprotected by eyelids. Although they have no external ear, they hear well and are affected by musical sounds. In all species the sense of sight is comparatively feeble. On the snout are two nostrils that indicate a high development of the sense of smell, upon which sense the animal relies quite largely in the pursuit of its prey. The forked tongue can be protruded with much facility, and is thought to serve as an organ of touch as well as taste.

Poisonous serpents have two fangs in the upper jaw and above them is a gland that elaborates the poison. Through the center of each fang is a small tube that serves for the passage of the venom, which is conducted from the glands by a duct or tube and forced into the object bitten. The poison fangs are set in a movable plate and turned back when not in use, but assume an erect position when the mouth is open. Snakes are oviparous, usually depositing from ten to seventy eggs. These are covered with a soft shell and are exposed to and hatched by moist heat. The pythons are the only snakes that defend their eggs and incubate them by the warmth of the body. Many of the fresh-water and sea snakes retain the eggs in the body until the embryo is fully developed, hence these species bring forth living young. Snakes are largely flesh-eating animals and feed on insects, birds, reptiles, and small quadrupeds. They are able to swallow food thicker than themselves, a curious fact that may be observed in a small ground snake swallowing a frog, and in the boa crushing its prey by constriction through the powerful muscles of the mouth.

SNAPPING TURTLE, the name of a tortoise found in the fresh waters of North America, so called from its fierceness in defending itself against its enemies. The body is about twenty inches in length, though it sometimes exceeds three feet. The tail is long and the head is snakelike, but the shell is too small to permit either to be entirely covered. It has jaws of great strength and is capable of holding itself so firmly to the object it bites that it is pulled or lifted from the ground. A species known as *alligator snapper* is found in the lower basin of the Mississippi. The female deposits about thirty eggs in June, digging for that purpose holes in a sand bank with its hind feet. The eggs are about an inch in diameter, white in color, and nearly globular.

SNIPE, a genus of wading birds. They are common to America and Europe, frequenting the regions along the shores of rivers and lakes and the marshy places. The *American,* or

GRAY SNIPE.

Wilson's, snipe is found in large flocks, especially in marshes, and is a favorite for the fine flavor and nutritious quality of its flesh. It is about ten inches long, has strong legs, and the long, slender bill is well adapted to search for insects and mollusks under the water. The color is brownish-black above and whitish below and the voice is a peculiar bleating cry. The *great gray snipe* is common to the western regions of Europe. It is somewhat larger than the common snipe of America, while the *red-breasted snipe* frequents the shores both of America and Europe. The latter is about ten inches long with an alar extent of eighteen inches. The *jacksnipe* is somewhat smaller and is indigenous to Europe and Asia. Snipes com-

(Opp. 2664)

SNIPE AND OTHER GAME BIRDS.

Greater Yellowlegs Snipe.
King Rail.
Quail.
Ring-necked Pheasant.
Ruffled Grouse.
Spruce Grouse.
Wilson's Snipe.

mon to America move far into Canada in the spring, where they breed, and migrate southward in the fall, usually to the gulf region.

SNOHOMISH (snō-hō'mĭsh), a city of Washington, in Snohomish County, 38 miles east of north of Seattle, on the Snohomish River. It is on the Great Northern and the Northern Pacific railroads and is surrounded by a fertile farming and mining region. The chief buildings include the high school, the Masonic and Odd Fellows' halls, and several fine churches. It has extensive lumber mills, waterworks, electric lighting, and sanitary sewerage. Formerly it was the county seat, but that is now at Everett. Population, 1920, 2,985.

SNORRI STURLUSON (snŏr'rē stōōr'-lōō-sŭn), historian, born in Iceland in 1179; died Sept. 22, 1241. He was a favorite of Jon Loptsson, a prominent chief, and in his home became familiar with the saga literature of Iceland and Norway. By his marriage to a wealthy woman he became the head of a large following and was speaker of laws for some time. In 1212 he visited Norway and Sweden, but the rulers of Norway suspected him of faithlessness, which caused him to lose the good will of King Haakon. He is prominent in the literature of Iceland as a poet and historian, and has been compared with Herodotus by some writers. His "Heimskringla," or "Ring of the World," embraces the history of Norway and is interspersed with numerous songs. It contains the *Olaf Saga,* an important part of the literature of ancient Norway. Many translations have been made, including the *Prose Edda,* of which Snorri is thought to be the author.

SNOW, the particles of frozen moisture which result when the air is condensed to a temperature below 32° Fahr. An assemblage of

FORMS OF SNOW.

such crystals is called a *snowflake. Hail* and *sleet* are caused by raindrops that freeze in their passage through the air, but snowflakes are formed when the vapor crystallizes, and they are enlarged in size in falling by condensing additional moisture from the air. In mild weather they are larger than when it is extremely cold. They assume a large variety of beautiful forms; fully a thousand have been classified by observers. Snow crystals are viewed to the best advantage under the microscope when they are allowed to fall on a black surface, but the finest forms occur only in the polar regions. The star shape is the most common form. Some appear as hexagonal plates and others as hexagonal prisms, and they are often terminated by plates or a group of needles. A number of the forms of snowflakes seen after a light fall of snow are shown in the accompanying illustration.

The incident rays of light are refracted and reflected by the irregular crystal clusters and operate to give to the eye the colorless sensation of white, but when pressure is applied to bring the crystals into close contact, snow assumes the form and appearance of ice. If the temperature of the air near the surface is warmer than 32° Fahr., any snow that is formed in the upper regions melts before reaching the ground. It is in this way that the absence of snow in the tropics is accounted for, where it falls only near the summits of lofty mountains. Snow melts slowly in the polar zones, thus accounting for the large accumulations in the high latitudes, but the fall is heaviest in the cool temperate regions. Snow seldom occurs south of 36° north latitude, except in regions modified by high altitudes.

The *snow line* is the lower limit of the region of perpetual snow, above which the ground is covered with snow throughout the year, while below the line it melts in the warm season. The altitude of the snow line depends upon latitude. In the Himalayas, Lat. 31° N., it is 17,000 feet; in the Rocky Mountains, Lat. 43° N., 12,465 feet; in the Andes of Ecuador, Lat. 1° S., 15,800 feet; in Norway, Lat. 70° N., 3,400 feet; and in the Andes of South America, Lat. 54° S., 3,700. As a rule, that slope of a range which is exposed to the prevalent wind has a lower snow line than the opposite side. In the polar regions the snow line gradually nears the level of the sea.

Snow is an important factor in the economy of nature. It is a nonconductor of heat. Where it falls in abundance it forms a protection to the ground and thereby prevents the temperature from lowering to an extent that would injure seeds and plants. The winds are generally modified by coming in contact with regions covered with snow, while the snow melting on mountains supplies an abundance of water for irrigating arid lands and serves to replenish the rivers by its gradual conversion into water in the warm season. Glaciers are immense masses of ice and snow. They are formed by large accumulations in the snow fields situated above the snow line. *Red snow* was first mentioned by Aristotle, who found deposits of it on elevated mountain summits. It is most abundant in the Arctic regions and is due to the prevalence of minute organisms of vegetable growth.

SNOWBERRY, the common name of a bushy shrub of the honeysuckle family. It is

cultivated extensively in America as an ornamental plant. The leaves are simple and the flowers are small. It bears a leafy cluster of snow-white berries at the ends of the branches. The *West Indian snowberry* is a plant of the madder family and is cultivated in greenhouses for its white berries.

SNOWBIRD, a genus of birds of the finch family, native to North America, and commonly seen in flocks during the winter. It ranges from Mexico to the northern regions of Canada, is about six inches long, and has a slaty-gray color above with white beneath. The snowbird is often seen near houses and barns in the winter time, and in cold weather seeks shelter in haystacks and corn shocks. Snowbirds usually congregate in small flocks, and visit the barnyards in search of food. They subsist on seeds and berries. Their flesh is eaten.

SNOW BUNTING, a bird of the bunting family, widely distributed in America and Europe. It differs from the true buntings in having a long and nearly straight claw on the hind toe, and it is similar to the lark in its habits of running along the ground. In the summer time large numbers are seen far north in the Arctic region, but it moves to temperate climates in autumn. The color is a rusty-brown in winter and tawny in the breeding season, but there is less change in the female than in the male. The body is about seven inches in length and, while on the wing, it utters a pleasant song. It feeds mostly on seeds and insects. Soon after arriving in temperate regions, it becomes very fat and is then esteemed delicate food. Great numbers are killed in Greenland and dried to be eaten in winter.

SNOWDROP, a genus of early blooming bulbous plants of the *amaryllis* family. Several species are cultivated for ornament. The bulbous root produces only a few leaves and a single-flowered, leafless stem. They are native to Europe, but have been widely naturalized and greatly improved and are now grown extensively in gardens. The flower is a single white, drooping growth and issues from a scape on the flower stem. The *four-winged snowdrop* is a tree that ranges southward from Virginia. It reaches a height of fifty feet, has four-winged seeds, and bears ovate-oblong leaves.

SNOW LINE. See **Snow.**

SNOWPLOW, a mechanical device for removing snowdrifts from railroads and street car lines. Machines of this class are used extensively on railroads in the northern section of North America and other cold regions. Small snowplows are frequently attached to the engine pulling the ordinary passenger or freight trains, but larger machines are mounted on an eight-wheeled car and pushed forward by an engine attached to the rear end. In cases where great drifts have accumulated two engines are frequently attached, thus giving an immense propulsive power. The snowplow is so constructed that its cutting blades throw the snow toward both sides from the track, but in some the drift is only in one direction. Another class, the *rotary plow,* has buckets which scoop the snow and convey it to a hopper, whence it is blown by a fan. The rotary plow is pushed along the track by the locomotive, but the working part is operated by a special engine. With devices of this kind it is possible to remove a drift of snow ten feet deep and a half mile long in a few minutes. A smaller implement is manufactured to be drawn over the common highways by horses and over car lines by electric power. Snowplows of American manufacture have been exported to Russia and other countries of Europe.

SNOWSHOE, a device made of sinew, rawhide, wood, or some other light material, and fastened to the bottom of the foot to support the wearer in walking over snow. Those made of sinew or rawhide have a light wooden frame, over which the material is stretched, and there is a device in the center for attaching it securely to the shoe. The length varies from two to five feet and the width from one to two feet, it being necessary to have a large surface to prevent sinking into loose snow. Shoes of this kind are worn extensively by the Eskimos, Sioux Indians, and Caucasians in regions far north. The *skee* is a snowshoe, or skate, which is used extensively in Scandinavian countries. See **Skate.**

SNUFF. See **Tobacco.**

SNYDERS (snī'dērs), **Frans,** painter, born at Antwerp, Belgium, in 1579; died Aug. 19, 1657. He descended from Flemish parents, studied under Peter Breueghel, and was a friend of Rubens. He visited Italy to study his art and returned to his native country in 1609, when he took up his residence in Antwerp. Rubens employed him to paint fruit and pictures of the chase, in which he excelled. Many of his pictures are in the galleries of Europe, including those in Dresden, Brussels, Antwerp, and London. His finest productions include "Prometheus and the Eagle," "Two Lions Pursuing a Roebuck," "Diana's Hunt," and "Concert of Cats."

SOAP, a substance made by uniting oils and fats with alkalies. It is used for washing and cleansing and in medicine. Soap is a chemical compound that has served valuable domestic purposes from the early historical period of Europe. It is singular that the art of manufacturing it was first learned by the Romans after their conquest of Gaul. At present there are manufactures of soap in all countries, it being a staple article of the world's commerce, and its use is firmly established among all peoples having any semblance of civilization.

The common soap of household use consists of a combination of potash and soda with certain constituents derived from oils, grease, and fats. Among the principal fats and oils em-

ployed are lard, tallow, and fish oils. In certain grades, especially in the finer soaps, it is common to use linseed, castor, palm, hempseed, olive, cocoanut, and other vegetable oils. The particular ingredients vary according to the kind of soap wanted, depending upon the different purposes for which it is intended. The three classes of soap may be grouped as soft soaps, coarse household soaps, and fine soaps.

Soft soap is a compound of potash, or soda and potash, with the fatty acids derived from the dry oils, such as linseed oil, whale oil, and fish oil. It is soft and pasty to the touch and dissolves more readily in water than hard soap. Soda and tallow are the chief ingredients in manufacturing coarse *household soaps.* Resin is added in making yellow soap. Mineral and other colors added in the process of manufacture produce the mottled soap, while the *fine soaps* generally contain carbonate of soda and olive oil. The toilet soaps are usually highly perfumed and nicely colored. The grades intended for medical use are prepared of olive or almond oil and caustic soda. Soap intended for general household use is made by boiling the potash and soda with the fats and, after the soap rises to the top, it is run off into frames to be cooled and solidified into cakes. The cakes are usually wrapped in paper and boxed ready for shipment.

SOAPSTONE, or **Steatite,** a compact variety of talc, composed chiefly of impure hydrated silicates of magnesia. It is durable and takes a high polish, and is so named from its soapy feeling when touched by the hands in a moist condition. A variety known as *freestone* is cut into small blocks and heated to keep the feet warm while driving during cold weather. Some species of soapstone are ground for use in making toilet powder and others are employed in making sinks, stoves, and building stone. Extensive deposits are found in New England and in the Lake Superior region.

SOBIESKI (sŏ-byĕs'kĭ), or **John III.,** King of Poland. See **John III.**

SOCIAL DEMOCRATS, the name applied to a body of socialists, whose aim is to carry on industry for the benefit of society as a whole, instead of recognizing the competitive methods existing at present. There is a noticeable growth of sentiment in favor of forming a socialist party, both in America and Europe, though the advocates differ widely in different countries as to the principles declared essential to reorganize society, or to bring about improvement in economic conditions. As a general rule economists do not favor socialism and, instead, reject it on the ground that science does not support it. As a whole it may be said that the great majority who favor a political socialist party are rather social reformers than socialists in a direct sense. The first attempt to embark in the political campaign in the United States took place in 1900, when Eugene Debs received 94,552 of the popular votes for President. In the campaign of 1904 there was a division and two parties resulted, Debs being the candidate for President of the Social Democrats and Corregan of the Social Labor party. The former received 397,208 votes and the latter, 32,516 votes. In Illinois Debs received 69,225 votes, the largest in any one State, and more than 25,000 votes were polled for him in each California, New York, Ohio, and Wisconsin. The heaviest vote polled for Corregan was in New York, 9,127 votes. In the election of 1924 the party polled only 29,110 votes in the country.

Much attention was attracted to the heavy vote polled in Germany in the election of 1903. In that year the party polled 32 per cent. of the total number of votes cast and elected 81 members to the *Reichstag* out of a total membership of 397. However, the membership increased in 1914 and 1924. The vote of the social democrat party in that country is shown in the following table:

YEAR.	SOCIALIST VOTE.	MEMBERSHIP.
1871	124,655	2
1874	351,952	9
1877	493,288	12
1878	437,158	9
1881	311,961	12
1884	549,990	24
1887	763,128	11
1890	1,427,298	36
1893	1,876,298	44
1898	2,107,076	58
1903	3,011,114	81
1914	4,250,399	110
1924	13,760,089	129

In the United States socialism is supported by 150 periodicals. The leading publications include the *Social Standard,* Pittsburg; *Cleveland Citizen,* Cleveland; *Social Democratic Herald,* Milwaukee; *People,* New York City; *Appeal to Reason,* Girard; *Volkzeitung,* New York; and *Chicago Socialist,* Chicago. Belgium, Italy, Austria, Denmark, France, Russia, England, and Japan each have socialist parties or associations of more or less strength and the movement is supported by a number of periodicals in each of these countries. The socialist vote polled since 1924 in the countries of the world where the party has been organized is reported as follows:

Netherlands	65,743	United States	598,516
Denmark	76,612	Australia	1,441,270
Finland	268,186	Belgium	1,501,346
Italy	3,301,525	France	4,120,406
Great Britain	5,508,482	Germany	13,760,089

SOCIALISM (sō'shạl-ĭz'm), the term variously applied to theories of social organization, which aim to reorganize society on the basis of coöperation rather than competition. It is applied in a loose sense to all schemes for abolishing social inequality. When employed in this aspect it is generally designated as Utopian socialism, which strives to build up an ideal state of society founded on principles of justice. *Scientific socialism* is a term applied to an economic theory. It affirms that the material from which labor produces wealth, that is, land,

should be the property of the community instead of individuals. Socialism is older than political economy, but in the last century it took on many new phases and won a much larger following than was previously attracted to it. The growth of socialism has been so rapid within the last fifty years that many writers speak of it as a new theory of government, which is a correct view only when applied to its influence upon the present aspect of political parties in constitutional governments, in which socialism under various names has entered into the public policy and institutions through the development and growth of organized parties.

While an ideal socialistic state of society aims to vest in the government functions to control the organization of all the industries of the country, socialism as a political force is seeking to stimulate the gradual adoption of certain reforms, such as government control of telephones, telegraphs, railroads, mines, and other industries, aiming of course to extend this control as the conditions of society warrant. Its advocates argue that socialism is but the highest state of evolution in society, and that by a process of natural development it will ultimately secure recognition as a fundamental principle in government. They cite the fact that *slavery* was once an extensive institution, but gave way to feudalism, while *feudalism* was succeeded by capitalism, and *capitalism* will necessarily be replaced by socialism.

Modern writers have produced an extensive literature on the subject, which is constantly influencing thought among the laboring and industrial classes, both in America and Europe. The earliest influential socialist of England is Robert Owen (1771-1858), and F. M. C. Fourier is a noted advocate of that theory in France. However, the most eminent writers and advocates of this school of economy are German and Russian. Socialism in Germany had its rise preceding the Revolution of 1848 under the leadership of Karl Marx and Friedrich Engels, and as early as 1890 the socialist party had a powerful political organization, sufficient to elect about one-half of the representatives in the legislative bodies. However, the tendency among the socialists of Germany and other European countries is to modify their theories by assuming a more compromising attitude toward other political parties, and in this way to secure a gradual introduction of their theories. The Social Democratic party of America was formed in Chicago, in 1897, as an organization succeeding the American Railway Union, which was dissolved at that time. Eugene V. Debs became the leader of the new party, which declared its purpose to be the uniting of all persons who are in favor of the *coöperative commonwealth* as a substitute for the present *competitive system.*

Christian socialism claims to be the result of applying the teaching of Christ to national, social, and commercial life, and not merely to personal conduct. It partakes rather of the aspect of a religious organization than a political influence. The advocates of this theory of government urge the view that Christ dealt more largely with the principles looking to the betterment of the conditions of life in this world than with organizing a future state. They maintain that He placed the community before the individual and taught that the foundation of society is brotherhood, not competition for profit. They hold the view that a really Christian society is socialistic, hence they adopted the name of Christian Socialists. See **Feudal System; Labor; Political Economy; Serf; Slavery,** etc.

SOCIAL SETTLEMENT, an association of individuals for the purpose of improving the educational and industrial conditions of the poorer classes. Settlements of this kind are maintained in the poorer districts of certain cities and are promoted by men and women of culture. Toynbee Hall, named after Arnold Toynbee, was established in the White Chapel district of London in 1884 and is one of the earliest social houses or settlements to be founded. The College Settlement, in New York City, and the Hull House, in Chicago, were opened in 1889 and are among the earliest of the settlements in America. They were soon followed by the Chicago Commons, Chicago, and the University Settlement, New York City, and many others. Institutions of this kind are now maintained in the leading cities of the world, including Berlin, Chicago, London, Paris, New York, and many others. The courses include physical, educational, esthetical, and industrial training. Religious instruction is nonsectarian and is confined largely to Sunday talks. All branches of economic art receive attention, especially spinning, weaving, gardening, dressmaking, fruit growing, and domestic economy. See **Addams, Jane.**

SOCIETY ISLANDS (sō-sī'ĕ-tȳ), an island group in the South Pacific, lying directly east of Australia and south of the Hawaiian Islands. It consists of thirteen main islands and a large number of smaller ones. The group has an area of 650 square miles. Tahiti is the principal island. The surface is generally elevated, with mountains of considerable height. A ridge of highlands extends across Tahiti, which terminates in Mount Orohena, height 8,500 feet. Other summits reach elevations ranging from 3,500 to 6,980 feet. The climate is mild and healthful and the soil is generally fertile. Among the chief productions are cotton, coffee, sugar, guava, lemons, oranges, and other tropical products. The shell fisheries possess considerable value and it has deposits of minerals, such as clay, iron, and granite. Horses, swine, cattle, sheep, and poultry are grown in abundance.

The Society Islands were discovered by the Portuguese in 1606, and were first visited by the English in the time of George III., in 1767.

Captain Cook explored the islands in 1769, naming them in honor of the Royal Society of London. France established a protectorate over them in 1844 and the entire group is now a French colony. The government is administered by a resident governor, who is assisted by a council. A general council elected by popular vote has more or less legislative power. Steamboat lines are maintained between Tahiti and San Francisco and the Hawaiian Islands. The colony has considerable export and import trade. About 50 per cent. of the commerce is with the United States. Papeete, on Tahiti, is the principal town and seaport. Most of the inhabitants are Malays. Population, 1922, 18,685.

SOCIOLOGY (sō-shĭ-ŏl'ŏ-jў), the science which treats of the constitution and development of human society. It analyzes and classifies social facts and embraces an explanation of the history and first principles of social phenomena. As a branch of natural philosophy it is closely associated with ethnology, political economy, comparative jurisprudence, social and political history, and the comparative study of religions. Plato made a careful study of society in ancient times, as is set forth in his "Laws" and "Republic," and Aristotle made a scientific classification of social facts in his "Politics."

The word *sociology* was coined by Auguste Comte, who is the earliest of the modern writers on this subject to give it a place of more than ordinary prominence. He spent twelve years in preparing his course of "Positive Philosophy," which embraces the social doctrine known as *Positivism* and treats of the entire wants of man as an intellectual being. Another epoch-making work is Herbert Spencer's "The Study of Sociology," in which he treats society from the standpoint of evolution. He advances the view that societies are initiated by military and industrial influences, but overlooks the important feature of critical and legal reconstruction through the enlargement of intelligence. As man becomes conscious of the benefit of society, he naturally attempts to defend and improve it. In the evolution of laws and institutions, natural selection works quite as prominently as in the case of individuals. Those that do not benefit society usually disappear, though frequently only after long periods of time, and the survival of the fittest, even if realized, is not apparent or understood at its inception. Some writers describe society as an organism, itself made up of a multitude of conscious organisms.

SOCRATES (sŏk'rà-tēz), eminent Greek philosopher, born in Athens about 469; died in 399 B. C. He was the son of a sculptor named Sophroniscus, under whom he learned the same art, which he practiced in early life. A group of the Graces, formerly situated on the road to the Acropolis, is the most noted of his sculptures. His education included gymnastics, music, geometry, astronomy, and philosophy, and he had training in the thought and culture of the Greek leaders. He served as a common soldier in three different campaigns, winning the praise of his friends for deeds of remarkable bravery. The first of his larger military successes was in the campaign of Potidaea, in 432-429 B. C.; the second was in the battle of Delium, in 424; and the last was a march with Cleon against Amphipolis, in 422. His ability as a scholar and teacher won many supporters; thus, he became an important factor in political life, and two memorable occasions bring him into historical notice. The first was when he served as the presiding judge on the occasion of the trial of ten officers who had neglected to bury the bodies of the killed after the Battle of Arginusae, in 406. At that time the Greeks made a great public clamor that the offenders should be punished and the court wished to proceed even without observing legal form, but Socrates refused to put the question. The other instance was when he and a number of other citizens were requested by the tyrannical government of the Thirty to take part in the confiscation of property, which he refused to do, even at the peril of his life.

Socrates withdrew from public service soon after and devoted himself to philosophy and the instruction of pupils. He practiced plain living, showed remarkable indifference to heat and cold, and was a familiar figure on the streets of Athens, where he became distinguished for his fund of humor and his power of argument. It was his aim to support right for right's sake, to seek truth for truth's sake, which made him unpopular among certain classes of Athenians. From his plan of carrying on his investigations originated the term *Socratic Method*. These investigations proceeded from propositions generally received as true, and in connection with them he placed the particular statement to be examined in a variety of combinations, thus implying that each thought must, if true, be maintained as valid under every possible combination. Xanthippe, his wife, is assumed to have been a scold. It is alleged that he married her to secure a discipline which would aid him in solving the philosophy of life.

Greece had emerged from the conflict with despotism at the time of Socrates' birth and was embarked on its great career of literary, philosophical, and political activity. Athens was becoming the greatest city in the world, being renowned for its academies, schools, and men of thought and action. Among the eminent philosophers of that time Socrates was preëminently the moralist, and he saw the bearing of false philosophy on the daily conduct of the individual as well as on the larger affairs of state. Though he conformed to the outward ceremonies of the national worship and spoke of the gods with reverence, he frequently referred to the existence of one Supreme Being who, unlike the gods of Greece, was uniformly

wise and just. While establishing no particular school, he addressed those that gathered about him on the street and in public places, thus exercising a wide influence on the opinions of young men by his methods of detecting ignorance and suggesting the path of real knowledge. His discourses were largely concerned with human duties and happiness. To impress the fulfillment of life's functions, he endeavored to widen knowledge of human nature.

A formal indictment was preferred against him by the tragic poet Meletus, who charged that he committed the crime of not acknowledging the gods held sacred by the city and that he had corrupted youth. He appeared for trial before the Heliaea, the most numerous and important court of Athens. The defense which Socrates made is usually called the "Apology" and is one of the writings of Plato, though it is thought that at least a part of this work was interpolated by the latter. The vote taken condemned him by 281 to 220, and, although he expected the condemnation, he was surprised that the majority was so small. He was given opportunity to escape, but refused. In accordance with the decision of the judges he drank the fatal hemlock with composure thirty days after his sentence. His last days were spent in discussing the immortality of the soul in the presence of his friends, who, in different times of his life, included Plato, Aeschines, Antisthenes, Euclid of Megara, Aristippus, Alcibiades, and Xenophon. Plato in his "Phaedo" fully describes the death of Socrates, and closes by saying: "This was the end of our associate; a man, as it appears to me, the best of the men of that time with whom we were acquainted, and besides this, the most wise and just."

SODA, chemically, an oxide of sodium, but the term is applied in ordinary language to an impure carbonate of soda, which is used for glass making, washing, and hard soap. Carbonate of soda is usually manufactured from common salt and from the mineral cryolite, a double fluoride of sodium and aluminum, of which large quantities are found in Greenland. It is a white powder, is soluble in water, and attracts water and carbonic acid from the air. Large quantities are manufactured for the trade. It is sold extensively in small boxes and cans.

SODA WATER, an effervescent drink, consisting of water strongly charged under pressure with purified carbon dioxide gas, usually entirely free from soda. It is so called because the gas with which it is charged was formerly generated from sodium bicarbonate with an acid. Large quantities are sold annually, mostly in the warmer season as a refreshing drink, and it is taken principally in cases of debility of the stomach. To flavor it a fruit syrup is added, such as the syrup of lemon or strawberry, and it is sometimes enriched with cream. Soda water is prepared by the vender by means of a fountain. A form of soda water called *pop* is flavored and put into bottles, in which form it is sold in the market.

SODIUM (sō'dĭ-ŭm), a metallic element of the alkalies, of which soda is the oxide. It is closely allied to potassium and has a bluish-white color and a high luster. The specific gravity is .972. It melts at 204° Fahr., readily oxidizes in the air, and decomposes when dropped upon water. Sir Humphry Davy obtained the metal of sodium in 1807 soon after he had discovered potassium. Nearly 40 per cent. of the immense quantities of common salt that exist in the ocean, in the deposits of rock salt, and in the brine springs may be classed as sodium. Many compounds of sodium have been studied, the uses of which are very numerous in the manufactures. Soda is obtained from sodium. It yields protoxide of sodium, carbonate of sodium, and hydroxide of sodium, the last mentioned being frequently called *caustic soda.* To obtain protoxide of sodium, the sodium is burned in oxygen or dry air, while hydroxide is the product of the reaction of sodium with water. Common salt is a compound of chlorine with sodium. Plants growing near or in the sea contain more or less sodium and it also occurs in many animal fluids. Many uses are made of sodium and its compounds in the medical practice.

SODOM (sŏd'ŭm), an ancient city of Syria, which is mentioned frequently in the Bible in connection with Gomorrah. These two cities were situated near the southern shore of the Dead Sea, though this is disputed by some writers, and it is accounted that they were destroyed for their wickedness by a shower of fire descending from the heavens, which has led to the view that their sites are covered with the waters of the Dead Sea. Other cities mentioned in connection with their history are Zeboim, Admah, and Zoar, but it is specially cited that the last mentioned was not destroyed because of Lot's supplication.

SODOM, Apple of, the name given by ancient writers to a fruit found in Palestine, especially in the vicinity of the Dead Sea. It is described by Josephus and Strabo as beautiful to the eye, but galling and bitter to the taste, and was said to fill the mouth with ashes. These writers probably have reference to a large gall caused by an insect on dwarf oaks, since they are bitter and are filled with a porous substance.

SOERABAYA. See **Surabaya.**

SOFIA (sō'fē-yà), or **Sophia,** the capital of Bulgaria, on the Bogana River, 175 miles southeast of Belgrade. It occupies a fine site on a plain between ranges of the Balkan Mountains and is surrounded by a productive region. Sofia has railroad connections with Constantinople, Budapest, and other trade emporiums and is the center of a large trade. It has a number of narrow and tortuous streets, but many modern improvements have been effected since Bulgaria

obtained its independence in 1878. It has a number of fine public buildings, several churches and schools of higher learning, a modern cathedral, and many mosques. The streets are lighted with electric lights. They are provided with rapid transit, telephones, waterworks, and sewerage, and several of the principal thoroughfares are substantially paved. It is the seat of the national university and of an archbishop's palace. The Romans knew it by the name of Sardica. It passed successively through attacks waged by various peoples, until it became a Turkish possession in 1382. The Russians occupied it in 1878. With the independence of Bulgaria it was made the capital. Population, 1922, 104,687.

SOIL, that part of the upper stratum of the earth's crust which furnishes nutriment to plants. It is formed partly from particles resulting from the wearing of rocks and the decomposition of vegetable and animal matters. Soil exists wherever the surface is not composed of rocks or covered with water, though the term is sometimes applied in a wider sense to the areas below water that yield vegetable forms. Drift soils are the product of glacier action, while alluvial soils are those resulting from floods and water in motion. The term *subsoil* is applied to the mass of earth or rock lying beneath the soil proper, and this is usually quite free from a mixture of decayed vegetable matter. The term *transported soil* is applied to that formed from particles of rock carried to lower regions, while *sedimentary soil* results from the disintegration of rocks whose particles are not transported. Soil varies in appearance, composition, and fertility according to the particles forming it, and the particular class of crops that may be profitably cultivated is largely dependent upon its constituents. Among the different substances forming soil are lime, silica, alumina, soda, magnesia, ammonia, and alkalies.

All soils contain a considerable quantity of moisture. They hold intact various metallic oxides as well as hydrogen, oxygen, carbonic acid, and other gases. The fertility of the soil on hillsides gradually decreases by the water resulting from rains, which washes the more productive parts into the valleys. For this reason it needs to be replenished with manures more frequently than the soils of the more level lands. This circumstance accounts for the fact that the best lands for cultivation and pasturage are found in the valleys along rivers and among hills. Soil loses productiveness by continuous cropping, especially if the crops are not alternated. In arid regions the subsoil is of great importance in retaining moisture, especially if constituted of such strata as serve to prevent the rapid passage of moisture through it. This is especially true if the subsoil is not located more than two to five feet below the surface soil.

SOKOTO (sō'kō-tō), a town of Africa, situated in the Niger Territories, on the Sokoto River, a tributary of the Niger. It has a number of mosques and several government buildings constructed by the British. The manufactures include cotton goods, utensils, jewelry, and earthenware. The streets are regularly platted, but they have been illy improved, and the city is surrounded by a wall. Sokoto was formerly the capital of the Fulah kingdom, an extensive region now included in the Niger Territories. It is a British protectorate. The city has a population of about 75,000.

SOLAR ENGINE (sō'lẽr), an apparatus in which the energy of solar heat is utilized as a motive power. The problem of originating a system which will successfully employ the heat of the sun as a propelling force, next to perpetual motion, has engaged the attention of many who have sought for a convenient and inexpensive power to drive machinery. Small air engines have been operated with considerable success through the agency of expanding air, which has been made possible by the use of large mirrors. In 1901 a solar engine was constructed on this principle. It has a large mirror of a circular form and the rays of the sun are reflected upon a small boiler set in the direction of the sun, the position within the circular mirror being such that the rays are reflected upon it from all sides. The water within the boiler is thus converted into steam and conducted to an engine, by which a pump or other machinery may be put in motion. It is necessary to properly adjust the mirror in the morning so as to catch the rays of the sun, and by means of a system of clockwork it is turned so as to keep in proper position as the sun passes through its course during the day. Solar engines develop several horse power, depending upon the condition of the atmosphere, but are not serviceable during the time of a cloudy sky

SOLAR MICROSCOPE (mī'krō-skōp), an instrument which throws the magnified image of the object illuminated by the sun's rays upon a wall or screen. It is used to facilitate the study of minute objects. The common solar microscope consists of a mirror for reflecting a beam of sunlight through a tube, which sometimes is fixed in a window shutter; of a condenser or large lens for converging the beam upon the object; and of a small lens or magnifier for throwing an enlarged image of the object at its focus upon the screen or wall in a darkened room or box. The lime light can be employed successfully in this instrument, instead of the sun's rays. One that uses such a light is called an *oxyhydrogen microscope.*

SOLAR SYSTEM, the sun and the group of celestial bodies which, held by its attraction, revolve around it. It has the sun as its center. Besides the sun, it includes the major planets, with their satellites; the minor planets, or asteroids; and the comets. In it are comprised

the meteoroids, the matter that furnishes the zodiacal light, and the rings of Saturn. The fixed stars are not included in our solar system, but are supposed to be the centers of other solar systems quite similar to our own. The nebular hypothesis (q. v.) accounts for the development of heavenly bodies. According to it all the matter composing the bodies of the solar systems was scattered very thinly through the untold vastness of the celestial space, but gradually centers of attraction formed, and these centers pulled in toward themselves other particles. This process went on for countless ages, swifter in some regions of space than in others. The sun was undoubtedly the first of these centers to assume shape and large form, and afterward other centers formed and gathered particles with more or less rapidity, thus constituting the planets and other heavenly bodies. See **Planets.**

SOLDER (sŏd'ẽr), a fusible alloy used for joining metallic surfaces or margins. It must be more highly fusible than the metal or metals to be united, and with this object the components and their relative amounts are varied to suit the character of the work. In the ordinary process of soldering small particles, two metallic surfaces are placed together, and a small quantity of solder is melted from the stick or cake by a soldering iron, which has been previously heated in a furnace. The hot iron is applied to the joint for the purpose of forming the solder into a uniform fluid and, after equalizing its distribution, the exposed surface is carefully smoothed. It is necessary to have the surfaces cleaned perfectly by scraping before joining them, and generally muriatic acid or sal ammoniac is used to remove all particles of foreign matter, else the solder will not become firmly fixed. A hard solder made of gold and copper, or gold, copper, and silver, is employed for soldering gold; while a solder of silver and brass is used in soldering silver. The soft solders used in ordinary work are formed of equal parts of lead, tin, and bismuth, or equal parts of lead and tin.

SOLDIERS' HOMES, the institutions built and supported by the government for the care and maintenance of soldiers honorably discharged from service, whose disability prevents them from earning their living. The first to be constructed were under the national government, but later many states founded and now maintain extensive institutions of this kind. At present about 25,000 soldiers are provided for in the soldiers' homes maintained by the national or state governments. The largest under national control is the Central Soldiers' Home at Dayton, Ohio, having 4,750 members, and the largest under state control is the institution at Quincy, Ill., where 1,050 are maintained.

SOLEY (sō'lĭ), **James Russell,** jurist and author, born in Roxbury, Mass., Oct. 1, 1850. He graduated from Harvard University in 1870, was admitted to the bar, and taught the English branches a year at the United States Naval Academy. In 1872 he was made professor of history and law at the same institution, and from 1876 to 1890 he was professor in the United States Navy. In the latter year he was made Assistant Secretary of the Navy, serving until 1893, when he began the practice of law in New York City. He was counsel for Venezuela in 1899 at the Paris arbitration of the boundary between Venezuela and British Guiana. He published "Foreign Systems of Naval Education," "The Boys of 1812," "History of the Naval Academy," "Blockade and the Cruisers," and "Life of Admiral Porter."

SOLFERINO (sŏl-fĕ-rē'nō), a town in northern Italy, twenty miles northwest of Mantua, in the province of Brescia. It is celebrated as the site of a famous battle between the Austrians under Emperor Francis Joseph and the French and Sardinians under Napoleon III. and Victor Emmanuel, which occurred on June 24, 1859. It terminated in the overwhelming defeat of the Austrians, who lost 20,000 men in the battle that continued for sixteen hours, while the allied army lost 18,000. The whitened bones of the slain soldiers lay on the battlefield until 1870, when they were gathered and deposited in three great sepulchers by representatives of Austria, France, and Italy. The town has a tower known as the Spy, from which the plains of Lombardy may be viewed to an advantage.

SOLID (sŏl'ĭd), in physics, a substance that is held in a fixed form by cohesion among its particles, hence excludes any other material particle or atom from occupying the same space. In a solid the molecular attraction is stronger than molecular repulsion, but it varies greatly in different solids. This property distinguishes a solid from a liquid or a gas, which offers little resistance to influences that tend to change their shape. The term solid is applied in geometry to any magnitude that has length, breadth, and thickness. In this sense it is a part of space bounded on all sides, but the term volume is sometimes substituted for solid. See **Matter.**

SOLITAIRE (sŏl-ĭ-târ'), the name of a game of cards played by one person, supposed to have been invented by a prisoner confined in the Bastille of France. Originally the game was played with glass balls, but now it is usually with an entire pack of cards. The purpose is to play until, after consecutive manipulation, the entire number of cards is placed in consecutive order in four piles, according to the suits. The game is played variously, hence requires the use of a manual for definite information.

SOLOMON (sŏl'ō-mŭn), meaning *peaceful,* the third King of Israel and the most noted sovereign of the Israelites. He was the second son of David and Bathsheba, and was selected by his father as successor to the throne in prefer-

ence to his elder brothers. The successful reign of Solomon extended for the period of forty years, from 1015 until 975 B. C. The treasures left by his father were applied judiciously in perfecting the political institutions of the kingdom. He extended commerce, encouraged industrial arts, and gave to Hebrew worship the height of magnificence by constructing a temple of great beauty. He is noted as a wise and judicious ruler, who won the hearts of his constituents by successfully defending the nation against invasions. His caravans and fleets were alike effective in bringing precious woods, gold, silver, and gems to Jerusalem, while his horsemen brought steeds from Egypt, and his architects constructed fortifications and palaces and reared cities. Toward the later part of his reign his court became noted for its magnificence and luxury. However, he brought foreign women into his harem, who persuaded him to tolerate and worship their idols. Slowly opposition to the extravagance of the government became manifest and when his son, Rehoboam, succeeded to the throne, the kingdom became divided. The Jews still celebrate the reign of Solomon as the most prosperous epoch of their history. The name of Solomon is connected with three canonical books of the Old Testament—the *Song of Solomon, Proverbs,* and *Ecclesiastes.*

SOLOMON, Song of, or **Canticle,** a book of the Old Testament, constituting a lyric poem in the form of a dialogue. The principal subject treated of is chaste love, which, in its purity and faithfulness, is canonized in this book. It was interpreted allegorically of God and his people by the rabbis. The Christian church followed this method of interpretation, but referred the allegory to Christ and the church. Love is here described as the strongest and holiest of human passions, as the strongest sentiment of mankind, being a flame of Jehovah which cannot be extinguished. Although no satisfactory date of the time and authorship are known, it is probable that the book belongs to the time of Solomon.

SOLOMON, Wisdom of, a book of the Apocrypha, sometimes called the *Book of Wisdom.* It consists of three parts. In the first it attacks the philosophy of Greece, especially that of the Epicureans, and it is shown that spiritual ruin comes to those who are absorbed in worldly affairs. The second part eulogizes wisdom and relates how Solomon came to choose it for his companion. In the third part the influence of wisdom upon the history of Israel is illustrated, and the evils of folly practiced by the heathen nations is put to scorn. See **Bible.**

SOLOMON ISLANDS, an island group in the Pacific Ocean, lying east of New Guinea and north of the New Hebrides. It is one of the most extensive groups in the Malay Archipelago, containing a large number of more or less important islands. The total area is about 16,000 square miles. The group is well watered. It has a damp climate and several chains of lofty mountains, some of which attain heights of 8,000 feet above the sea. The highlands have a climate favorable to Europeans. Among the principal products are yams, cocoanuts, rice, cotton, fish, poultry, swine, sugar, and many species of tropical fruits. These islands were first discovered by the Spanish in 1567, but were rarely visited until in the last century. By a treaty between Germany and Great Britain, in 1885, the islands became possessions of these two nations, the northern part being subject to Germany and the southern part to Great Britain. A considerable trade is carried on by both countries, but the interior of the islands and the inhabitants have not become well known to Europeans. They are Polynesians of small stature and speak a language of the Malay type. Population, 1922, 182,500.

SOLOMON'S SEAL, a class of perennial herbs of the lily family, allied to the asparagus. The leaves are sometimes eaten as greens. The stem attains a height of from six inches to four feet, bearing sessile leaves and nodding, greenish flowers. A number of the species are native to North America, especially the *great Solomon's seal.* Several species are common to Europe. These plants bear a bluish-black berry, which is purgative. In most species the rootstalks are thick and knotted, with scars on their upper surface, due to the falling away of old stems growing vertically.

SOLON (sō'lŭn), the great legislator and one of the seven wise men of Greece, born in Athens in 638; died in 558 B. C. He descended from a distinguished family of Attica and not only acquired a liberal education, but enriched his mind by traveling. His travels were principally in connection with commercial enterprises, in which he became engaged because of his father having lost much of his wealth. The martial inclination of the Athenians had been crushed by reverses, but Solon revived the spirit of nationality and stirred his countrymen to recover Salamis. This he effected by writing patriotic poems, which were heralded throughout the nation, and he shared in the glories by having charge of the command of the army sent from Athens. Subsequently he was a highly influential citizen and became chief archon in 594 B. C. It was a period of conflict between the peasants and nobles, but by wise application of his authority a revolution was prevented.

SOLON.

Solon wrote a new constitution that enlarged the powers of the assembly. This document made property instead of birth the basis of citizenship, thus admitting the common classes as factors into the government, and it vastly improved the economic conditions by abolishing the provision under which a debtor could be reduced to slavery by his creditor. Luxury in dress and food were prohibited, the ownership of land was limited, and the general education of youth in schools and gymnasiums was provided for by statutory law. The statutes of Solon were written on pieces of wood and the Athenians were bound by oath not to repeal them for ten years, after which he went on extensive travels to avoid being requested to alter his laws.

He spent ten years in traveling through Asia Minor, Cyprus, Egypt, and Lydia, but, on returning to Athens, he found that the greed of the nobles had again caused serious dissensions. All parties still had such confidence in him that they readily submitted to his decisions, but later Pisistratus seized the sovereignty and overthrew the political constitution, though he allowed the social legislation of Solon to remain in effect. The story is told that Croesus, King of Lydia, asked Solon to state who could be counted the happiest man, when he replied: "Tellus of Athens, who died at the time his country was prosperous and just after he had defeated its enemy." Not satisfied with the reply, Croesus asked a second time, when Solon answered that in his judgment two Argive youths could be counted exceedingly happy, because the gods had permitted them to die in their sleep as a reward for an act of kindness. Few of the writings of Solon have come down to us, those generally considered from his pen being included in the collections of the Greek gnomic poets.

SOLSTICE (sŏl'stĭs), the period in the annual revolution of the earth around the sun at which it reaches its greatest northern or southern declination. This gives rise to two solstices in the year. The *summer solstice* occurs on June 22, when the sun shines directly upon the Tropic of Cancer, while the *winter solstice* takes place on Dec. 22, at which time the sun appears to traverse the Tropic of Capricorn. The sun is said to stand still for several days before and after the solstice, owing to the apparent declination of its rays being very slight.

SOLUTION (sŏ-lū'shŭn), the process by which a body is absorbed into a liquid, by means of a fluid termed the *solvent,* or *menstruum.* The product is also called a solution, and may be formed of a solid, a liquid, or a gas. Thus, if water is poured upon a quantity of sugar, the solid sugar will take on the liquid form, the water serving as the solvent. Water dissolves many solids and is used extensively as a solvent, but some solids require alcohol, ether, and other liquids to become dissolved. Only a given quantity of a solid can be dissolved in a liquid, since adhesion and cohesion balance each other at a given point, when the liquid is said to be *saturated.* Some solids are partly dissolved by heat, as gum camphor, but there are notable exceptions, as in the case of water immediately above the freezing point, at which temperature it will dissolve a larger quantity of lime than when at the point of boiling. Many liquids dissolve other liquids and gases, as in the solution of alcohol in water, but the latter will not dissolve oily liquids. Oils, on the other hand, may be dissolved by ether and benzene. However, water is a solvent of ordinary air and carbonic acid gas.

SOLWAY FIRTH (sŏl'wȧ), an inlet from the Irish Sea, forming a part of the boundary between Scotland and England. It extends inland toward the northeast a distance of 38 miles, receives the water from the Eden and Nith rivers, and has valuable salmon and other fisheries. The tides ebb and flow with great rapidity, usually from eight to ten miles an hour, and the inflowing waves attain a height of from three to six feet. At ebb tide large sandy tracts of the firth are left dry.

SOLYMAN II. (sŏl'ĭ-mạn), or **Suleiman,** surnamed *The Magnificent,* Sultan of Turkey, born in 1496; died Sept. 5, 1566. He was the son of Selim II., whom he succeeded in 1520, and immediately reformed the civil service. After establishing schools and internal improvements, he suppressed a revolt in Syria, exterminated the Egyptian Mamelukes, and made a peace treaty with Persia. In 1521 he captured Belgrade, the key to Hungary, and in 1522 made a successful attack on the Knights of Saint John in Rhodes, who were not only defeated, but their power and influence were limited materially. His reforms at home caused a revolt of the Janazaries, but he engaged them in a war against Hungary, winning a signal victory at Mohacs in 1526, and, after capturing Buda and Pesth, he laid siege to Vienna. However, his attack on Vienna proved disastrous, being required to withdraw from the siege in 1529 with a loss of 40,000 men. He returned to Hungary with a large army in 1531, where he was successfully opposed by Charles V. of Germany, but he concluded a treaty with the French, opening the Levant to the latter, and in 1542 ravaged Nice and the Italian coasts. Peace was restored with Germany in 1547. He soon after invaded Armenia and Persia, and subsequently enlarged his dominion in Northern Africa. In 1561 he won a naval victory over the Knights of Malta and in 1565 renewed his expedition to Hungary. His death occurred while he laid siege to the Hungarian town of Szigeth.

SOMALI (sŏ-mä'lē), **British,** a British protectorate in East Africa, lying south of the Gulf of Aden and east of Abyssinia. It has an area

of 59,900 square miles. The inhabitants are largely nomadic Mohammedans, who engage extensively in stock raising, chiefly that of cattle, sheep, and horses. It produces ostrich feathers, cocoa, indigo, coffee, gum arabic, hides, and fruits. The chief imports are cotton and cotton goods. Berbera is the principal city and seaport. Other cities are Bulhar, Karam, and Zeila. The government is administered under a consul-general, who is resident at Berbera. Population, 1922, 156,500.

SOMALILAND (sō-mä'lĭ-lănd), **Italian,** an extensive region of East Africa, belonging to Italy. It extends from the Gulf of Aden to British East Africa and from the Indian Ocean to Abyssinia. It and British Somali include all of the Somali peninsula. The area is estimated at 115,000 square miles. Horses, cattle, and sheep are grown in abundance. Ostrich feathers, gum, wool, live stock, coffee, indigo, and fruits are the chief exports. The native inhabitants are largely nomadic Mohammedans, who are a finely formed race, but they are still in a semibarbaric state. The language is a mixture of Galla and Arabic words. Italia is the principal seaport and the capital. Bardera, near the Juba River, has a large trade. The Webi and Juba are the most important rivers. The region is quite fertile, but has an extremely hot climate and considerable desert land. Population, 416,500.

SOMERSWORTH (sŭm'ĕrz-wûrth), a city of New Hampshire, in Strafford County, on Lake Sunapee, forty miles northeast of Concord. It is on the Boston and Maine Railroad. The surrounding country is fertile, producing grasses and cereals. Among the noteworthy buildings are the public library, the high school, the hospital, and several fine churches. It has manufactures of cotton and woolen goods, boots and shoes, machinery, farming implements, and vehicles. The vicinity was settled in 1729. It was chartered as a town in 1754 and became a city in 1893. Population, 1920, 6,688.

SOMERVILLE, a city of Massachusetts, in Middlesex County, on the Mystic River and on the Boston and Maine Railroad. It is a suburb of Boston, with which it has both steam and electric railway connections, and is a favorite residence center for many Boston business men. Among its principal buildings are the public library, the State armory, the Somerville Hospital, the home for the aged, the city hall, and many schools and churches. The leading industries are tanneries, meat-packing establishments, foundries, flour mills, brick works, and machine shops. The city occupies a fine site upon seven hills. On Prospect Hill Washington raised the first colonial flag, in 1776. Other features are Central Hill, the old Powder House, and Broadway, over which Paul Revere passed in his famous ride. The place was settled about 1631. For many years it was a part of Charlestown, but was set off as a separate town in 1842. It was incorporated as a city in 1872. Population, 1905, 69,188; in 1925, 99,032.

SOMERVILLE, Mary, scientist and mathematician, born in Jedburgh, Scotland, Dec. 26, 1780; died in Naples, Italy, Nov. 29, 1872. She was a daughter of Sir William Fairfax and, after securing a good education, married Captain Greig in 1804. Her husband was a commissioner in the Russian navy and died three years after his marriage. The widow again devoted herself to consecutive study. She married William Somerville in 1812 and with her husband removed to London in 1816, where she published a number of works possessing considerable merit. A pension was awarded her in 1855 and her later years were spent in Italy. Among her most important writings are "Celestial Mechanism of the Heavens," "Connection of the Physical Sciences," "Molecular and Microscopic Sciences," and "Physical Geography." The last mentioned publication went through a large number of editions. It was long a standard text.

SOMME (sôm), a river in the northern part of France, which rises in the department of Aisne and flows into the English Channel after a course of 152 miles. Canals connect it with the Seine, the Oise, and the Scheldt. It is navigable to Amiens.

SOMNAMBULISM (sŏm-năm'bû-lĭz'm), a disorder that affects some persons during a condition of sleep. It is due to more or less activity in some of the psychical and motor areas of the brain, while the centers that preside over consciousness are slumbering soundly. While in this condition different kinds of impulses may take place, such as sleep-talking, sleep-crying, and sleep-walking. The last mentioned phenomenon is more remarkable and less frequent than sleep-talking, which is of common occurrence among the young, but there are others quite as marvelous. Numerous instances may be cited in which somnambulists dressed themselves and walked in dangerous localities with perfect safety, even over places they would fear to tread during a state of wakefulness. Other instances include riding on horseback, conversing systematically, and frequenting the places at which they were occupied during the day. These phenomena occur in almost equal proportions among males and females, but are most frequent in youth, while they usually disappear when adult age is attained. They are more common to persons of nervous temperament, but may be artificially produced by hypnotism. Sleep-walking is closely allied to hysteria and epilepsy, and not infrequently alternates with these and allied diseases.

SONNET (sŏn'nĕt), a poetic composition which consists of fourteen rhymed verses, written according to a clearly defined plan. In the sonnet as perfected by the Italian humanists of the 14th century there are two parts, the first of eight verses and the second of six, known respectively as the *octave* and the *sestet.* The first

eight lines or verses make two quatrains and the remaining six form two tercets. In the quatrains there are two rhymes, the first, fourth, fifth, and eighth lines rhyming together, which is true likewise of the second, third, sixth, and seventh. While this is considered the best arrangement, other plans are often used, even in the works of Petrarch, in which the rhymes are alternate. Greater liberty is allowed in the tercets, in which the rhymes may be either two or three, but they must not occur in couplets.

The writers of sonnets are numerous, but few Americans have ever written in this style. The Romance languages, especially the Italian and Spanish, are well fitted to express fanciful feeling in the sonnet, but in English it is preferred to treat only the grave and contemplative in this style. Goethe, Uhland, Schlegel, and Tieck are the leading writers of sonnets in German; and Shakespeare, Drummond, Spenser, Milton, Mrs. Browning, Spencer, and Wordsworth, in the English. Good examples of sonnets are Mrs. Browning's "Sonnets from the Portuguese" and Milton's "On His Own Blindness."

SONS OF LIBERTY, the name assumed by a society organized in Connecticut in 1755, the object being to promote religious liberty. Colonel Isaac Barré, in a speech in Parliament on Feb. 6, 1765, applied the phrase to the party in America who opposed the enactment of the Stamp Act. The name was afterward adopted by a number of societies who favored the separation of the colonies from Great Britain, many of which were secret organizations.

SONS OF VETERANS, a society organized at Philadelphia, Pa., in 1879, to which all lineal male descendants from honorably discharged soldiers and sailors of the Civil War are eligible. This patriotic society is a companion organization of the Grand Army of the Republic, the chief society of Federal veterans. About 100,000 members belong to the society, which includes 2,000 local camps and 29 state divisions. The Daughters of Veterans is a similar organization, to which daughters of honorably discharged soldiers and sailors, as well as daughters of Sons of Veterans, may be admitted when attaining the age of fifteen years.

SONSONATE (sōn-sō-nä'tā), a town of Salvador, in Central America, 40 miles west of San Salvador. It is situated on a plain and has railway facilities by the line passing from Santa Ana to the port of Acajutla. The surrounding country is fertile, producing large quantities of sugar cane, tobacco, and fruits. Population, 1922, 18,150.

SONTAG (zōn'täg), **Henriette,** eminent vocalist, born in Coblenz, Germany, Jan. 3, 1806; died in Vera Cruz, Mexico, June 18, 1854. After studying in her native city, she took an advanced and classical musical course at Prague. She was by nature a singer and appeared with eminent success at Prague when only fifteen years of age. Afterward she was given marked evidences of appreciation in Vienna, Berlin, Paris, Hamburg, and other European cities. In 1829 she married Count Rossi, an Italian nobleman, but reappeared on the stage in 1849, meeting with enthusiastic reception both in America and Europe. She made an extensive tour of the United States and afterward went to Mexico, where her death occurred from exposure to cholera.

HENRIETTE SONTAG.

SOOCHOW (sōō'-chou), or **Suchau,** a city in China, on the Imperial Canal, 54 miles northwest of Shanghai. It has water communication with Shanghai, which is its port, and its trade is of material importance. The city is inclosed by a wall ten miles long and is divided into several parts by canals. It has extensive manufactures of silk and cotton goods, clothing, porcelain, books, and utensils. The surrounding country possesses much fertility, and the city is adorned with many beautiful gardens and parks. The inhabitants are generally cultured and refined and have good educational conveniences. Soochow has a large number of fine temples, hospitals, colleges, and government buildings. Population, 500,150.

SOOT. See **Lampblack.**

SOPHIA (sō-fī'ä). See **Sofia.**

SOPHIA, Church of Saint, the most celebrated and valuable edifice of the Mohammedans, located in Constantinople. It was erected by Emperor Justinian, who dedicated it in 558 as a place of worship for the Eastern Church. This noble structure remained in the hands of the Christians until 453, when Constantinople was captured under Sultan Mohammed, who replaced the cross by the crescent of Islam. The interior is richly decorated with paintings and mosaics and a fine dome surmounts the edifice. This dome has a diameter of 105 feet and a height of 184 feet.

SOPHIST (sŏf'ĭst), meaning a man of wisdom, the name given to a school of teachers in Greece, who flourished in the time of Socrates and for several decades immediately preceding, about the middle of the 5th century B. C. The period at the time of their origin was one of social and political decline and it was the main intent of the school to establish a liberal education to supplement the customary instruction in gymnastics, reading, writing, and music. It is noteworthy that the sophists held almost a monopoly of general education for nearly a hundred years, but they were considerably divided among themselves, both in their theory and practice, and many of them were mere critics of the

philosophers who had lived before. The superior grade of these teachers included Protagoras of Abbera and his disciples, Gorgias and Hippias of Elia.

The sophists taught many branches of higher learning. They consisted of the four classes known as teachers of disputation, politics, culture, and rhetoric. With the establishment of the noted philosophic schools known as the Academy and Lyceum, the philosophers took the place of the sophists as the educators of Greece. Both Socrates and Plato accused them of teaching unsocial doctrines, and alleged that they endeavored to make the worse appear the better cause of action. The later sophists were generally accused of being self-seeking and mercenary, though this view was undoubtedly overdrawn, since the sophists are known only by the writings of their antagonists.

SOPHOCLES (sŏf'ō-klēz), eminent Greek tragic poet, born near Athens in 495; died in 405 B. C. Endowed by nature with remarkable talent for music, he was early shown preferment in leading musical choruses, and at the age of 16 conducted the ceremonies in the celebration of the anniversary of Solon's conquest of Salamis. His education ranked with the most liberal given in his time to Athenian youth. When 28 years of age he won the prize formerly awarded to Aeschylus, who shortly after retired to Sicily, but on one subsequent occasion competed with Sophocles for the first prize. The latter was regarded the most scholarly and efficient poet until in 441, when the first prize was won by Euripides. However, Sophocles excelled both these great poets in the number of his triumphs, the first prize falling to him 24 different times, and he won the second on a number of occasions. In 440 B. C. he published his drama entitled "Antigone," a production of such value that it not only gained the prize, but caused his appointment with Pericles and eight other generals to command against the aristocratic party in Samos. He was a prolific writer, being credited with 130 plays, of which only seven are extant. He wrote a number of epigrams, elegies, and paeans, but few of these are among the preserved works. His writings show great mastery of human passions. They are elevated in moral tone, have purity of style, and exhibit personal dignity. Those still extant include "Antigone," "Ajax," "Electra," "Oedipus at Colonus," "Trachiniaen Women," "Philoctetes," and "Oedipus Tyrannus."

SORATA (sō-rä'tà), or **Illampu,** the highest mountain in Bolivia, situated about 16 miles east of Lake Titicaca. It is an extinct volcano. The highest point is 21,495 feet above sea level. Sir William M. Conway ascended it in 1897.

SORBONNE (sôr-bŏn'), a famous college of the University of Paris, so named from its founder, Robert of Sorbon, who established it in 1252 with the sanction of Louis IX. He had been selected as the chaplain and confessor of the sovereign at a time when the University of Paris held a place of great eminence, and decided to open an institution in which priests could teach theology gratuitously, but regulations were made to obtain the necessaries for their maintenance. The founder provided for sixteen professors, four each in the Norman, French, Picard, and English, and shortly after faculties in German and Flemish were added. Robert drew up the constitution and became the first head, and no substantial changes were made until the French Revolution. Originally destined for poor students, the Sorbonne soon became a meeting place of large numbers from all walks of life, and received many students from the University of Paris.

Theology was the only branch of study pursued. Those attending were provided with a place to live at the institution, instead of finding lodging elsewhere, as had been the early custom in France. The institution rapidly attained to a high position and became the leading theological school in Europe, attracting students from countries far remote. In it were trained the greater number of the Paris doctors. Cardinal Richelieu, in 1629, opened the present buildings in the Quartier Latin. The old university was destroyed by the Revolution in 1792, and when it was reorganized by Napoleon, in 1808, a faculty of theology was established at the Sorbonne. At present there are seven chairs in theology and, in addition, lectures are given and degrees are conferred in the branches of science and literature. Napoleon III. projected a reconstruction of the buildings. He formulated plans under which work was begun in 1884 and completed in 1889. The old church was retained on account of its artistic merit. It contained the tomb of Richelieu.

SOREL (sō-rĕl'), a city of Quebec, capital of Richelieu County, 45 miles northeast of Montreal, at the confluence of the Richelieu and Saint Lawrence rivers. It is on the Quebec Southern and the Canadian Pacific railways. The manufactures include clothing, ships, earthenware, and machinery. Among the chief buildings are the county courthouse, the high school, the Carlton and Brunswick hotels, and many schools and churches. It has a large trade in grain and produce, much of which is shipped by steamboats on the Saint Lawrence. A majority of the people are French. The place was settled in 1665, when a fort was built here. Population, 1901, 7,057; in 1921, 8,174.

SORGHUM (sôr'gŭm), a plant which resembles broom corn and sugar cane. Several species are cultivated for the manufacture of a nutritious molasses, but in dry regions it is grown quite extensively for fodder. The sorghum plant is native to China, whence it was introduced into France, and in 1856 it was brought to America. The seed resembles that of broom corn. It is usually drilled in rows at the same time of the season that corn is planted.

The growth is slow for several weeks after coming out of the ground, but later it grows rapidly and usually attains a height of eight to sixteen feet. It is stripped of its leaves and cut before frost, usually in September or October. The stalks are pressed in a cane mill for the juice, which is reduced by boiling to molasses or sugar. An acre yields from 75 to 150 gallons of molasses or sorghum. The seed is highly valuable for its nutritive quality, but is not used extensively as a food. Sorghum can be cultivated wherever corn grows, but also in more arid regions, where it is cut several times in the season as fodder for stock. The Kaffir corn of South Africa is a kind of sorghum. It is grown successfully for its seed and fodder in the region from Saskatchewan to Texas.

SORGHUM PLANTS.

SORREL (sŏr′rĕl), a genus of perennial herbs of the buckwheat family. They are allied to the docks, from which they differ in their leaves and acid. The species common to America is the sheep sorrel, which is found in pastures and poor soil. The common sorrel of Europe has narrow leaves and grows to a height of from one to two feet. It is used in making soups, sauces, and salads. The *sorrel tree* of America belongs to the heath family and is native to the Allegheny Mountains of the South. It has white flowers and leaves about five inches long, which become crimson in early fall.

SOTHERN (sŭ′thĕrn), **Edward Askew,** eminent actor, born in Liverpool, England, April 1, 1830; died in London, Jan. 31, 1881. His parents designed to have him study for the church, but he preferred a theatrical career, playing with varied success in different parts of Great Britain. On his first visit to America, in 1852, he was not highly successful, but in 1858 he assumed the character of *Lord Dundreary* in "Our American Cousin" and met with distinguished success. Other chief rôles include those of *Brother Gam, David Garrick,* and the *Crushed Tragedian.* His second son, Edward Hugh Sothern, was born in New Orleans, La., Dec. 6, 1859. He first appeared with his father in 1876, playing successfully at the Abbey Theater in New York, and later played with John McCullough and John T. Raymond. His chief rôles were in "One of Our Girls," "An Enemy to the King," "The Prisoner of Zenda," "Lord Chumley," and "Captain Letterblair." In 1904 he joined Julia Marlowe in touring Canada and the United States. He is classed among the most successful actors of America, while his father is classed among the eminent players of England.

SOUL, the part of man that renders him a rational and spiritual being; the spirit that distinguishes him from the lower animals. The word is sometimes used as a synonym of mind and of spirit, but each has an application not suitable to the others. Mind includes reason, conscience, and a free will, while soul in its limited use does not. The spirit differs from the soul in that the latter is always associated with a being that lives or has lived, while spirit may be applied to a being that may not have or have had such a connection. Aristotle and the Scholastics assumed that soul means the primary principle of life. They held that plants have a vegetable soul, that all animals are endowed with a sensitive soul, and that man alone has a rational and immortal soul. Their view of the superiority of the human soul was based on the fact that man has the power of mind to form abstract ideas.

All Christians hold that the soul is responsible for the deeds done in the body, but differ in view regarding the future state. Some believe that in the final judgment each soul will have its lot irrevocably fixed for eternal existence, others hold that those first punished may pass through a transitory state into bliss, while still others believe in total annihilation of the unjust. Many eminent philosophers held the doctrine of the preëxistence and transmigration of the soul, a view still commonly supported by many people. Christians are generally divided into two classes, one holding that each soul is produced by natural generation, and the other that each is separately created by God. Modern materialists regard soul a result of organism and a function of the body.

SOULT (sōōlt), **Nicholas Jean de Dieu,** Marshal of France, born at Saint-Amans-la-Bastide, France, March 29, 1769; died Nov. 26, 1851. He was the son of a notary in his native town and in 1785 enlisted as a private in the military service, rising to the rank of general in 1799. After serving on the frontier of France and Germany in the latter year, he was assigned to a division under General Massena in Switzerland and Italy. Napoleon made him a consular guard in 1802 and promoted him to the rank of Marshal of France in 1804. His eminent service in the Battle of Austerlitz caused him to be created Duke of Dalmatia, in 1807, and soon after he pursued the retreating British in Spain, conquered Portugal, and won many victories over Sir John Moore and Wellington. On Nov. 12, 1809, he won the noted victory of Ocaña, and the following year reduced all of Andalusia except Cadiz. He was obliged to retreat from Andalusia after Wellington's victory at Salamanca, when a disagreement with Joseph Bona-

parte caused him to be recalled from Spain. Napoleon soon after reinstated him and made him commander of the fourth corps of the grand army, thus commanding the center at Bautzen and Lützen. He was soon after sent to the south of France to repair the losses resulting from the defeat of Vittoria, but was obliged to surrender at Toulouse in 1814.

Soult declared himself a royalist after the first abdication of Napoleon and was made minister of war. When Napoleon returned from Elba, in 1815, Soult again became a Bonapartist and served as major general in the campaign of Waterloo. The royalists banished him after the fall of Napoleon, but he was recalled in 1819, and the following year made Marshal of France. He supported Louis Philippe after the Revolution of 1830, served as minister of war from 1830 to 1834, and in 1838 was ambassador to London for the coronation of Queen Victoria. From 1840 to 1844 he again served as minister of war, and retired from public service in 1847 with the title of marshal general. He wrote his "Memoirs" shortly before his death, and a part of the work was published by his son, Napoleon Hector Soult.

SOUND, a term admitting of two definitions: the sensation produced upon the organ of hearing by vibrations in matter, and the vibrations of matter capable of producing a sensation upon the organ of hearing. In the first use of the word there can be no sound where there is no ear to catch the vibrations, but in the latter use there can be a sound in the absence of the ear. Sound waves result when a sonorous body is struck or a person speaks, and these are propelled by molecular motion until those which fill the cavity of the ear are pressed against the tympanic membrane, when the vibration is transmitted to the auditory nerve and by it to the brain, which takes cognizance of the sensation. The air is alternately condensed and rarefied as the sound wave advances, and the motion of the air particles is alternately backward and forward in the same direction in which the wave is advancing. This motion, as in water waves, is a movement of the form only, while the particles vibrate but a short distance to and fro. Just as the length of a water wave is measured from crest to crest, so a sound wave is measured from condensation to condensation.

An elastic medium is necessary to convey sound waves from the sounding body to the ear. No sound is heard from a bell struck in a vacuum, since there is no medium in which waves may be produced to carry the sound. Air being an elastic body, it transmits sound waves readily, but they are carried also by liquids and solid substances. Solids possessing elasticity are better conductors of sounds than either liquids or gases, which may be verified by putting the ear to the ground on the approach of a horseman, or to the rail on the approach of a train. Sound travels through air at 32° Fahr. 1,090 feet per second. The velocity increases with the temperature, this being due to the fact that an increase of temperature both decreases the density and increases the elasticity. In water at ordinary temperature sound travels about 4,700 feet per second, and its velocity varies greatly with the nature of solids used as a conductor. In the metals it is from four to sixteen times that in air. The velocity of all ordinary sounds is the same, this being observable in the harmony maintained by a band playing at a distance, in which the soft, loud, high, and low notes all reach the ear at the same time.

Sound waves diminish in intensity in an inverse proportion to the square of the distance, and travel faster with the wind than against it. They may be reflected, refracted, and inflected. When reflected they produce echoes; by refraction they may be converged on any spot, and by inflection they may be bent around solid obstacles. Musical sounds depend upon a succession of impulses at a regular rate, the pitch of the note rising with the rapidity of the impulses. Noise is produced when smoothness and regularity are absent, as in striking several keys on a piano, or firing a gun. The capacity to perceive sound waves varies in different persons, the highest being roughly estimated at 48,000 vibrations per second and the lowest at 16 per second. When the number of impressions on the ear in each second is less than 16, the hearer perceives them separately, and when they exceed 48,000 the sound becomes too shrill to be audible. A *speaking trumpet* is a conical instrument held to the mouth of the person talking, and is used to cause the voice to be heard at great distances. The *ear trumpet* is employed to aid persons partially deaf in hearing, and acts to concentrate the sound of the voice.

SOUND, The, a strait of Europe, which is situated north of Germany. It connects the Cattegat with the Baltic Sea and separates Sweden from Denmark. The Sound is about fifty miles long. It is an important waterway between the North and the Baltic seas. Denmark collected toll from all merchant vessels passing The Sound from the 15th century until 1857, when the duties were abolished by an indemnity to Denmark amounting to $16,000,000, and it was stipulated at the same time that the treaty nations must maintain lighthouses on its coasts. Strong fortifications are maintained at its entrance, the most prominent being the fortress of Kronberg.

SOUNDING, the process of measuring the depth of water and the quality of the bottom of the sea, usually by a plummet lowered from a ship. Formerly the plummet consisted of a rope on which the number of fathoms were marked and at its end was a piece of lead, but in deep water it was quite difficult to determine whether the weight had reached the bottom. Plummets are made at present by attaching an elongated lead weight, supplied at one end with an opening

to receive the connection, at which a wire rope is fastened. Usually two plummets are carried by vessels, one weighing eight or ten pounds, called the *hand lead,* and one weighing 20 to 65 pounds, called the *deep-sea lead.* Plummets intended to ascertain the character of the bottom are usually provided with a tallow-covered device at the lower side, to which gravel, shells, sand, and other particles adhere when the lead strikes the ground. Other sounding apparatus has been devised to facilitate scientific investigation of the depth and character of the bottom, and many records are extant as a result of extensive soundings.

The Tanner sounding machine is used in depths which do not exceed 500 fathoms (3,000 feet). For greater depths the Sigsbee machine, which reels in sounding wire by steam power, is used. On both machines steel piano wire is used in place of the hemp sounding lines formerly employed, its advantages being strength, lightness, and small bulk. With it, heavier sinkers can be employed to give an up-and-down trend, and its smaller surface per lineal foot renders it less liable than the hemp lines to be diverted from the vertical by currents.

A shot weighing about 65 pounds is attached to the sounding cylinder and is automatically detached when the bottom is reached, in order to lessen the tension when reeling in. The sounding cylinder used at present brings up a specimen from the bottom, while a water cup takes a sample of water within a few feet of the bottom, and a deep-sea thermometer automatically registers the bottom temperature.

The United States government recently employed the Sigsbee machine on the *Albatross* in taking soundings in the Pacific Ocean and found a depth of 4,813 fathoms (about five and a half miles), one of the deepest oceanic depressions in the world, about 100 miles southeast of Guam. The highest mountain in North America would be covered by nearly two miles of water if placed in this depression.

SOUSA (sōō'zà), **John Philip,** musical leader and composer, born in Washington, D. C., Nov. 6, 1856. He developed remarkable talent for music in early life, being noted as a performer in theater orchestras when only twelve years of age. In 1867 he joined a strolling company of performers and played in a circus band, but was soon after apprenticed by his father to the Marine Corps for a term of five years. This resulted in his becoming connected with the Marine Band at Washington, of which he ultimately became leader, a position he retained for twelve years. He was assisted by David Blakely in 1892 in organizing the famous Sousa's band. This band was organized on a patriotic basis in 1917 and served in the Navy. Among his musical compositions are "The Liberty Bell," "Sheridan's Ride," and "High School Cadets." He is the author of several popular operas, including "El Capitan," "The Charlatan," "The Bride Elect," "The Queen of Hearts," and "The Free Lance."

JOHN PHILIP SOUSA.

SOUTH AFRICAN WAR, the conflict for supremacy in South Africa, in the years 1899-1902, between Great Britain and the republics of the Orange Free State and the Transvaal. A large immigration had been attracted by the discovery of gold in the Witwatersrand, and this influx of foreigners into the republic organized by the Boers caused them to place greater restrictions upon the rights of citizenship. These immigrants were called *Uitlanders* and they were more or less opposed to the dominion of the Boers, since they were largely British subjects and had ties in language and citizenship with the predominating influences of Cape Colony and Great Britain. In order to forestall the development of a citizenship with a majority of British sympathizers, the Boers under the leadership of Paul Kruger, the president of the Transvaal Republic, in 1887, fixed the period of residence necessary before naturalization at fifteen years. This action caused much dissatisfaction, since many foreigners were not permitted to have a voice in the government.

In 1896 the affairs were brought to a crisis by the Jameson Raid, under the leadership of Leander Starr Jameson, but this movement was discredited by the British government. This incident was in effect a victory for the Boers, who greatly strengthened their position by placing legal restrictions upon the Uitlanders and utilizing their resources so as to be prepared for an armed conflict. Negotiations were conducted with the British government, which had been petitioned by the foreign inhabitants to intercede in their behalf in a friendly way, but the diplomatic negotiations proved futile. War was declared by the Transvaal Republic in October, 1899, and the Orange Free State immediately cast its fortune with the belligerent.

At the beginning of the conflict Great Britain had about 21,500 men in South Africa. These included a force of 12,000 in Natal, 1,000 in Rhodesia, 1,000 in Mafeking, 2,500 at Kimberley, and 5,000 in Cape Colony. This was a larger force than was mobilized by the Boers, who had about 20,000 men. The forces of the Transvaal and the Orange Free State immediately invaded Natal, routed the British at Nicholson's Nek, and marched upon Ladysmith, which was held by 10,000 troops under Sir George White, and under Petrus Joubert invested that place. Another force of Boers under Cronje besieged Mafeking, which was held by Colonel Baden-Powell with 6,000 men. Large reinforcements

were dispatched to South Africa and Sir Redders Buller undertook the relief of Ladysmith. In the meantime Lord Methuen was sent to Kimberley. The British suffered a defeat on the Modder River and sustained severe losses in obstinate fighting at Çolenso and Ladysmith. However, the British forces were rapidly increased to 130,000 men and by the latter part of February, 1900, both Kimberley and Ladysmith were relieved.

Bloemfontein, the capital of the Orange Free State, was captured by the British in March, when Lord Roberts declared that country British territory. After remaining at Bloemfontein more than a month, Lord Roberts decided to advance on Pretoria, the capital of the Transvaal. On the Vet River he encountered a force of Boers under General Louis Botha, but succeeded in moving forward upon Johannesburg, which he entered in May. Pretoria was occupied in June, but President Kruger had removed the capital to Machadodorp, and General Botha occupied a position a short distance from Pretoria. General Buller advanced northward with a large force to coöperate with Lord Roberts, and the combined army pushed forward against General Botha, who had taken a strong position at Bergendal, where he was defeated in August. The last battle occurred in September, 1900, when the Boers were defeated at Spitzkop, after which a large number crossed the border into Portuguese territory. Lord Roberts in the same month proclaimed the Transvaal to be British territory, naming it the Transvaal Colony. President Kruger sailed on a Dutch man-of-war from Lourenço Marques for Holland in October.

The conflict now resolved itself into a struggle of small bands against superior forces. Hostilities continued until in May, 1902, when the Boers concluded to accept the terms of peace offered by the British. These included that they acknowledge themselves subject to Edward VII., that no punishment should be inflicted upon them for any acts connected with the war, that the Dutch language be taught in the public schools on request of the parents, and that a civil government be established at the earliest possible date. It was likewise provided that the government to be established should be representative and that no tax to cover the expenses of the war should be levied upon landed property. In the conduct of the war great courage was shown by the Boers, who did not exceed 75,000 men in actual service. On the other hand, the British force in South Africa during the war numbered 450,000 men and officers. Of this number 52,000 were raised in South Africa, 31,000 were sent as volunteers from British colonies, and the remainder was made up of militia and regular troops.

SOUTH AMBOY (ăm'boi), a borough of New Jersey, in Middlesex County, 35 miles southwest of New York City. It is on Raritan Bay, at the mouth of the Raritan River, and on the Central of New Jersey, the Pennsylvania, and other railroads. On the opposite side of the river is Perth Amboy, with which it is connected by a bridge. The manufactures include machinery, brick, pottery, and clothing. It is a market for coal, fruits, and merchandise. Waterworks, electric lighting, and sewerage are among the public utilities. It was incorporated in 1898. Population, 1905, 6,258; in 1920, 7,897.

SOUTH AMERICA, one of the six grand divisions, the second in size of the Western Hemisphere and the fourth largest of the world, being exceeded in extent only by Asia, Africa, and North America. It is situated between 12° 45′ north latitude and 55° 30′ south latitude and between 35° 1′ and 81° 30′ west longitude. The extent from north to south, from Cape Gallinas to Cape Horn, is about 4,800 miles, the greatest breadth from east to west is 3,300 miles, and the area is 7,700,000 square miles. It is bounded on the north by the Caribbean Sea and the Atlantic Ocean, on the east by the Atlantic Ocean, and on the west by the Pacific Ocean. The Equator crosses the northern part and about one-third lies in the Temperate Zone, the remainder of the continent being in the Torrid Zone.

The coasts are more uniform than those of North America. A narrow stretch of land, the Isthmus of Panama, joins the two continents. This isthmus is indented on the south by the Gulf of Panama and on the north by the Gulf of Darien. On the northern coast of the continent is the Gulf of Venezuela, on the northeast are mouths of the Amazon, and on the southeastern shore are the estuary of La Plata, the Blanca Bay, the Gulf of Saint Matias, and the Gulf of Saint George. The western coast has the Gulf of Penas, the Gulf of Corcovado, and the Gulf of Guayaquil. However, all these indentations are comparatively small. The islands are uniformly small and lie near the mainland. They include Trinidad, off the northern shore; South Georgia and the Falkland Islands, east of the southern extremity; and the Galapagos Islands, west of Ecuador. Tierra del Fuego, in the extreme south, is separated from the mainland by the Strait of Magellan.

Description. The cordillera of the Andes trends along the western coast, from the Isthmus of Panama to Cape Horn, forming the loftiest ranges of the Western Hemisphere. It forms a natural continuation of the Cordilleras of North America. A narrow strip of low land, averaging less than a hundred miles, lies between these highlands and the Pacific coast. About forty active volcanoes are included with the peaks, but many others, some of which are characterized by huge volcanic holes, have long been extinct. Aconcagua, height 23,910 feet, is the highest peak of South America, but many other summits approximate it in height. The greatest altitudes are reached in the vicinity of 32° south latitude, whence the surface slopes with more or less irregularity both toward the north and the south.

PHYSICAL MAP OF SOUTH AMERICA.

Among the notable peaks are those of Cacaca, 20,250 feet; Cotopaxi, 19,613 feet; Antisana, 19,335 feet; and Chimborazo, 20,498 feet.

The secondary system of highlands is located in the northern part of the continent, mainly in Venezuela and the Guianas, forming a watershed between the Amazon and the Orinoco. This group of irregular mountains has a general altitude of 2,000 feet, but the highest peaks approximate 10,250 feet. A third system of highlands is situated in the eastern part of the continent, known as the Brazilian Highlands, which form an extensive plateau whose surface is much lower than the average altitude of the Andean system. The average height approximates 2,500 feet, although some of the many ranges are much higher. A large portion of the surface of the Brazilian Highlands is level, but in some sections they are cut by great cañons, and the rivers flow with considerable velocity or have extensive rapids and falls. In the eastern part it slopes quite abruptly toward the Atlantic, but in the interior it merges into a great central plain. Between the highland regions, extending from north to south, is the great plain which includes the selvas, the llanos, and the pampas.

The drainage of South America is chiefly into the Atlantic, owing to the fact that the Andes form a great and continuous watershed. Three vast river systems, those of the Amazon, the Orinoco, and the La Plata, discharge the larger part of the drainage. The Amazon, while not the longest river, discharges more water than the Mississippi and the Missouri rivers combined, hence takes rank as the largest water course of the globe. In the northern part is the Orinoco, which discharges almost as much water as the Mississippi, although it is smaller than the Saint Lawrence system. The central lowlands lying toward the south are drained by the estuary of the Rio de la Plata, which receives the Paraná, the Uruguay, and other tributaries. The estuary of this river is a lakelike expanse and the overflown territory in the rainy season resembles a shallow inland sea. In the northwestern part of the continent is the Magdalena, which drains the highlands of Colombia and flows into the Caribbean Sea. Another large stream, the São Francisco, drains a large part of the Brazilian Highlands and discharges into the Atlantic near 10° south latitude. Other streams which discharge directly into the sea or into some of the larger rivers include the Colorado, the Negro, the Chubut, the Salado, the Pilcomayo, the Tocantins, the Xingu, the Tapajos, the Madeira, the Ucayali, the Rio Negro, and the Cauca. The continent has no great lakes or inland seas, the only large body of water being Lake Titicaca, located on the border between Peru and Bolivia, at an altitude of about 12,000 feet. Lake Maracaibo, in Venezuela, is an inlet from the Gulf of Venezuela.

Climate. South America has a more equable climate than North America, owing to the fact that it lies on both sides of the Equator. However, it varies considerably by reason of differences in altitude and proximity to the sea, the colder sections being in the lofty highlands and in the extreme southern part of the grand division. Most of the tablelands near the Equator have a uniformly high temperature, the higher regions of the Andean plateaus are cold, and the southern part is extremely cold, variable, and disagreeable in the winter, especially in the months of June, July, and August. The seasons, instead of being designated as in North America, are known as the wet and dry seasons and are determined mainly by the occurrence of the equatorial rains. An enormous rainfall prevails on the Atlantic slope, especially in the northeastern part, where the annual precipitation ranges from 50 to 200 inches. This heavy rainfall extends throughout the valley of the Amazon, even to the eastern slopes of the Andes; hence the currents of air, being deprived of their moisture, move as dry winds down the western slope, where the rainfall is very scant. The driest belt is along the narrow coast of Peru and northern Chile, where the precipitation is only a few inches.

Flora. The vegetable life of South America ranges from that of the temperate to that of the tropical zone, being controlled largely by latitude, rainfall, and altitude. A large part of Colombia and Venezuela, having a hot climate and excessive rainfall, is characterized by luxuriant vegetation. The forms are tropical in character, except where the altitude is considerably above the sea. The equatorial forests are the most dense as well as the most extensive in the world, being approximated only by the vast forests of equatorial Africa. They are abundant in the valleys of the Orinoco and the Amazon, where they are known as the *selvas,* but nearly all parts of the grand division have an abundance of timber along the streams and in the mountains. A portion of the valley of the Orinoco, known as the *llanos,* is almost treeless. In the rainy season this section is covered with nutritious grasses, but vegetable forms become quite parched in the dry season, when the region of these plains resembles an arid desert. The great southern plains, known as the *pampas,* extend from the eastern summits of the Andes to the south central part of Argentina. They resemble the great plains of the south-central section of Canada and the Mississippi valley, having a gently undulating surface and being covered with valuable native grasses. Among the plants which are native to the continent are the potato, tree ferns, deciduous trees, several species of pampas grass, many palms and bamboos, and a large number of coniferae.

Fauna. The animal life of South America may be said to include that of the West Indies and Central America. Since many forms are isolated and materially different from those of North America, it is believed that the two con-

tinents were formerly separated and that they were united at a comparatively recent date. Eight families of mammals belong exclusively to this grand division, including several species of rodents, many edentates, the blood-sucking bats, and two families of monkeys. It has no ruminants, except the llamas, few insectivora, only one kind of bear, and no animals related to the horse, except one species of tapir. The birds include 23 families and 600 genera, many of which belong exclusively to the continent. The reptiles include the boas, the scytales, and several families of lizards and frogs. The birds of song and plumage are well represented, including the humming bird, the tanager, the flamingo, the toucan, the parrot, and the araçaris. A large number of sea fowl and birds of prey belong to the continent, the latter including the condor, which is the largest bird of this class. An abundance of fish is found in the fresh waters as well as off the shores.

Minerals. The continent is rich in many kinds of minerals, especially in gold, silver, diamonds, copper, iron, lead, borax, niter, and mercury. However, mining has been confined chiefly to the production of gold and silver. Gold occurs in the interior of Brazil, in southern Argentina, and throughout the greater part of the Andes. Silver is obtained in large quantities in Bolivia and other sections of the western highlands. Copper and mercury are mined in the Andes and on the northern coast. Iron deposits are known to exist in the three principal mountain systems, but this metal has not been produced extensively. Formerly Brazil was the principal source of diamonds, but the output is greatly surpassed by that of South Africa. Rich guano deposits are worked along the coasts of Chile and Peru, niter and borax are obtained in Chile, and coal is found in Brazil, Uruguay, Argentina, and Colombia. Venezuela is the principal source of emeralds and asphalt. As compared with Mexico, Canada, and the United States, the mining interests are not well developed.

Industries. Agriculture and stock raising continue to be the leading industries. Wheat is grown extensively in Argentina and Chile, these countries competing with the production of this cereal in Canada and the United States. Coffee is grown in large quantities in Brazil, which country continues to be the chief source of this product. Brazil, the Guianas, and Venezuela have a large output of sugar and tobacco. Cacao is grown in the valley of the Amazon and Orinoco, corn is cultivated more or less throughout the tropical regions, and fruits and vegetables are abundant, except in the extremely southern part. Bolivia, Peru, Colombia, and the valley of the Amazon produce large quantities of rubber and medicinal plants. Grazing is the principal industry in a large part of the valley of the Paraná, especially in southern Brazil, Uruguay, and large parts of Argentina. Cattle are bred extensively in the llanos of Colombia and Venezuela.

The manufacturing industry has not been developed as extensively as the resources would justify. Comparatively little has been done in the production of steel and iron. Although lumber is produced in large quantities, it is exported chiefly in a semimanufactured state. Argentina, Chile, Brazil, and Peru have a considerable railroad mileage in operation. Several transcontinental lines connect the Atlantic with the Pacific, but they are confined to the valley of the La Plata. A large part of the trade is carried on the rivers, many of which are navigable for long distances; but the Amazon, the La Plata, and the Orinoco are the most important in this respect. A large part of the interior trade is carried by mules and ponies. Oxen are employed extensively for farm work. The exports consist principally of coffee, cotton, silk, borax, silver, lumber, meat, hides, tobacco, and medicinal plants.

Inhabitants. South America was peopled by many tribes of Indians before the continent was discovered and settled by Europeans. Some of these inhabitants were powerful nations, having large cities and stable forms of government, but others constituted hordes of wandering tribes. The Araucanians were among the chief aborigines. They and kindred races occupied a large part of the highlands in the northwestern part of the continent, extending southward to Patagonia. They pursued agriculture, constructed canals and aqueducts, and maintained schools and other institutions common to an intelligent people. These peoples were either enslaved or became intermixed with the Spanish and Portuguese. At present a large element in nearly every country of South America consists of a mixture of Indian and European blood. However, many Spaniards, Italians, Portuguese, and Germans have settled in different sections. These people and their descendants comprise the leading commercial and industrial element.

Political Divisions. All the political states of South America are republics except Guiana, which is divided about equally among England, France, and the Netherlands. The countries are Panama, Venezuela, Colombia, Ecuador, British Guiana, Dutch Guiana, French Guiana, Brazil, Peru, Bolivia, Chile, Paraguay, Uruguay, and Argentina. The population, as reported by the latest census returns, is 53,850,580.

History. Columbus discovered the continent of South America in 1498, when he cruised along the northern coast and explored a portion of the Orinoco. Two years later the coast of Brazil was explored by Pinzon and Diego de Lepe. Pedro Alvarez Cabral discovered the continent independently while on a voyage to India by the route around Africa, which had been opened by Vasco da Gama. He explored the vicinity of Bahia, in the eastern part of Brazil, but he supposed this region to be a part of Asia. In 1513 Balboa crossed the Isthmus of Panama and dis-

CARIBBEAN SEA
NICARAGUA
MANAGUA
L. Nicaragua
COSTA RICA
SAN JOSE
PANAMA
Pta. Gallinas
Gulf of Venezuela
CURAÇAO (DUTCH)
BONAIRE I. (DUTCH)
ARUBA (DUTCH)
BARBADOS (BR.)
TRINIDAD (BR.)
Port of Spain
Sabanilla
Barranquilla
Cartagena
Colon
Gulf of Darien
Barquisimeto
Valencia
Puerto Cabello
La Guaira
Barcelona
Cumana
CARACAS
Maracaibo
Lake Maracaibo
Merida
Orinoco R.
Ciudad Bolivar
Delta of the Orinoco
GEORGETOWN
New Amsterdam
PARAMARIBO
CAYENNE
VENEZUELA
Antioquia
Medellin
Bucaramanga
Tunja
NEVADA DE TOLIMA
Ibague
BOGOTA
Buenaventura
Popayan
Esmeraldas
EQUATOR
COLOMBIA
MT. RORAIMA
SIERRA PACARAIMA
GUIANA
SURINAM (DUTCH)
FRENCH GUIANA
(BRITISH)
TUMUC-HUMAC MTS.
13000 ft.
6500 ft.
Gulf of Panama
Panama Canal
Panama R.
Magdalena R.
Cauca R.
Meta R.
Guaviare R.
Orinoco R.
Essequibo R.
Branco R.
Negro R.
Parima R.
Mouths of the Amazon River
Rio Para
Caiana I.
Marajo I.
Belem (Para)
São Luis
Parnahyba
Fortaleza (Ceara)
Aracaty
FERNANDO NORONHA I.
C. São Roque
Therezina
Parahiba
C. Branco
Recife (Pernambuco)
Maceio
Aracaju
São Salvador (Bahia)
Bahia de Todos os Santos
EQUATOR
QUITO
Cotopaxi
Chimborazo
Tolima
MT. CHIMBORAZO
Guayaquil
ECUADOR
Cuenca
Gulf of Guayaquil
C. Blanco
PUNTA PARINA
Piura
Chiclayo
Trujillo
Huarez
Mt. Huascaran
Huanuco
Cerro de Pasco
LIMA
Callao
Ayacucho
Cuzco
Arequipa
Mollendo
Tacna
Iquique
Antofagasta
TROPIC OF CAPRICORN
SAN AMBROSIO y SAN FELIX (TO CHILE)
Coquimbo
La Serena
Coplapo
NEVADO DE ACONCAGUA
ACONCAGUA VOL.
USPALLATA PASS
Mendoza
Valparaiso
SANTIAGO
TUPUNGATO VOL.
Talca
Chillan
Talcahuano
Concepcion
6500 ft.
JUAN FERNANDEZ Is. (TO CHILE)
Valdivia
Puerto Montt
CHILOE I.
CHONOS ARCHIPELAGO
TAYTAO PENIN.
G. of Peñas
WELLINGTON I.
HANOVER I.
Strait of Magellan
Punta Arenas
MT. DARWIN
HOSTE I.
STATEN I.
C. HORN
Iquitos
R. Tabatinga
Moyobamba
Huallaga R.
Ucayali R.
Yavari R.
Javari R.
Putumayo R.
Napo R.
Rio Negro
Rio Branco
Manaos
Amazon R.
Obidos
Madeira Falls
Madeira R.
Purus R.
Juruá R.
Tapajos R.
Roosevelt R.
Xingu R.
Araguaya R.
Tocantins R.
Gurupa R.
Parnahyba R.
Guaporé R.
Jurua R.
Rio Grande
Rio Tieté
Paraguay R.
Paraná R.
Uruguay R.
Iguassu R.
Fall of Guaira
Victoria Falls
Pilcomayo R.
Bermejo R.
Salado R.
Rio Negro
Colorado R.
Chubut R.
Rio Deseado
Gulf of St. George
C. Blanco
Gulf of San Matias
SAN JOSE PENIN.
Chubut
Santa Cruz
W. FALKLAND
FALKLAND Is. (BR.)
Port Stanley
E. FALKLAND
Strait of Magellan
TIERRA DEL FUEGO
SAN DIEGO
Mature Str.
SOUTH GEORGIA (BR.)
BOLIVIA
Trinidad
Matto Grosso
Cuyaba
Santa Cruz
Cochabamba
Oruro
Sucre or Chuquisaca
Potosi
Tarija
LA PAZ
ILLAMPU (SORATA)
ILLIMANI
Titicaca L.
Poopo L.
Puno
Arequipa
Mollendo
Tacna
SAJAMA VOL.
PARAGUAY
Villa Concepcion
Villa Rica
Asuncion
Corrientes
Santa Fé
Parana
Rosario
Cordoba
Tucuman
Santiago del Estero
Jujuy
Santa
Salta
NEVADO DE ACONCAGUA
ARGENTINE REPUBLIC
San Juan
Mendoza
Fray Bentos
Colonia
San Jose
MONTEVIDEO
Rio de la Plata
BUENOS AIRES
La Plata
C. San Antonio
Bahia Blanca
Rio Negro
Gulf of San Matias
Goyaz
Diamantina
Ouro Preto
Victoria
Campos
Petropolis
C. Frio
Nictheroy
RIO DE JANEIRO
Santos
São Paulo
Paranaguá
Florianopolis
Porto Alegre
Pelotas
Lagoa dos Patos
Rio Grande do Sul
Paysandu
URUGUAY
Salto
Iguassu Falls
Serra do Espinhaço
Serra do Mar
Serra Geral
Serra dos Vimores
Rio Doce
Rio Grande
Rio Tieté
Rio Francisco
Rio Parahiba
Rio Pardo
Rio Jequitinhonha
Rio Paraguassu
Rio Itapicurú
Rio Gurupy
Rio Tocantins
Rio Araguaya
Rio Xingu
Rio Tapajos
Rio Madeira
Rio Purus
Rio Juruá
Rio Jurua
Rio Negro
Rio Branco
Rio Guaporé
Rio Paraguay
Rio Mamoré
Rio Beni
Rio Madre de Dios
Rio Orton
Rio Abuna
Rio Acre
Rio Javari
Rio Napo
Rio Putumayo
Rio Caqueta
Rio Yapura
Rio Içá
Rio Japura
Rio Negro
Rio Uaupés
Rio Guaviare
Rio Meta
Rio Casiquiare
Rio Parima
Rio Orinoco
Rio Caroni
Rio Caura
Rio Paragua
Rio Branco
Rio Essequibo
Rio Cotinga
Rio Maroni
Rio Oyapock
Rio Araguary
Rio Gurupy
Rio Itapicurú
Rio Parnahyba
Rio Gurguea
Rio Jaguaribe
Rio Piranhas
Rio Parahiba
Rio Francisco
Rio Pardo
Rio Jequitinhonha
Rio Doce
Rio Grande
Rio Tieté
Rio Paraná
Rio Uruguay
Rio Iguassu
Rio Tibagy
Rio Ivahy
Rio Pepiry
Rio Negro

covered the Pacific. Magellan passed the southern point of the continent in 1520, when he discovered Tierra del Fuego and probably the Falkland Islands. Explorations were soon after made of the interior by Gonzalo Pizarro and Orellana. Cabot explored the Paraná in 1528, and Irala established an overland route from the La Plata to Peru. Many Spanish explorers devoted much time in the 16th and 17th centuries in search of El Dorado, the fabled king of a fabulous city that was supposed to exist somewhere in the northern part of South America.

The Spaniards and Portuguese began to claim all of South America as early as the 16th century, when they undertook to found colonies in different parts of the continent. Brazil was claimed by the Portuguese and Spain claimed the remainder of the coast. Later the two nations established claims to whatever lands they conquered, advancing steadily inland from the coasts. Francisco Pizarro captured Cuzco, the capital of the Incas, in 1533, and converted it into a Spanish settlement. He founded Lima two years later and made it the capital of his viceroyalty, which included the northwestern portion of the continent. Lima soon developed into an important city and became the center of a large trade. In the course of time the entire grand division was claimed by the Portuguese and the Spaniards, the former settling in the eastern part and the latter in the northern and western sections. No other European countries attempted settlements in South America, excepting only the French, Dutch, and English, who established claims to Guiana within the 17th century. These conditions remained stationary until the early part of the 19th century, when the Spanish and Portuguese colonies undertook to become freed from the dominion of the Europeans.

Simon Bolivar, taking advantage of the Napoleonic Wars in Europe and the War of 1812 in North America, developed a large following and eventually succeeded in establishing republics in Peru, Chile, Bolivia, Venezuela, and Argentina. Brazil became independent of Portugal in 1823, but retained a monarchical form of government until 1889, when the present republic was established. Negro slavery maintained a foothold until 1888, when it was finally abolished. None of the nations is as powerful as the United States or the larger countries of Europe. The people seem to lack the peculiar qualities manifested by the nations of Northern Europe, by which the latter carried civilization and industry to the different regions which they colonized in North America.

SOUTHAMPTON (sŭth-hămp'tŭn), a seaport city of England, on the Southampton Water, 70 miles southwest of London. The harbor is commodious and has ample dock accommodations. Communication is maintained by railways and electric lines with many inland towns. Among the principal buildings are the Saint Michael's Church, the Netley Hospital, the Holywood Church, the public library, the city hall, the public market, and many intermediate and secondary schools. The manufactures include sugar, hardware, spirituous liquors, vehicles, sailing vessels, steam engines, machinery, and textiles. It has a large foreign trade with the West Indies, Australia, South Africa, and the Mediterranean. The city is a fashionable resort in summer. It has fine street pavements, waterworks, street railways, and several parks. Population, 1921, 119,039.

SOUTH AUSTRALIA (ąs-trā'lĭ-ą), a State of the Commonwealth of Australia, situated in the central part of the continent. It is bounded on the north by the Timor and Arafura seas, east by Queensland, New South Wales, and Victoria, south by the Indian Ocean, and west by Western Australia. Extending across the continent from north to south, it has a length of 1,850 miles. The general width is from 550 to 700 miles. South Australia proper occupies the southern part, while the northern section is known as the Northern Territory, the latter having an area of 523,620 square miles. The total area is 903,690 square miles.

DESCRIPTION. The southern coast has more inlets of large size than any other part of the Australian shore, including Spencer Gulf, Encounter Bay, and Saint Vincent's Gulf. On the northern coast are Queen's Channel, Van Diemen Gulf, and the Gulf of Carpentaria; but the shores are more regularly formed than the southern. In the interior is an arid region with several mountain ranges and numerous lakes that have no outlet to the sea, the principal one of these being Lake Amadeus. Among the mountain chains of the north-central part are the Reynolds, the James, and the McDonnell ranges, and these have a general elevation of about 3,000 feet above sea level. In the southern part are the Stuart and other less important ranges, with peaks from 1,500 to 3,000 feet. As a whole, the State is a vast plain with an undulating surface, and much of the interior is a desert of sandy tracts and marshes.

None of the streams is important except the Murray, which enters the southeastern part and flows into Encounter Bay. The Macumba and the Cooper rivers flow into Lake Eyre, which has no outlet to the sea. Among the principal streams of the north are the Victoria, Daly, Alligator, Liverpool, and Gladstone rivers. The lake region of the south-central part, which is shut off from the sea by the Galler Range, has no visible outlet. The lakes within this region, besides Lake Eyre, include the Torrens, Gairdner, Frome, and Gregory lakes. During the dry season they are reduced to marshes with heavy salt crusts, but become quite deep during the periods of rains. In the interior the rainfall is very scant and the climate is extremely hot, but there is abundance of moisture and a corre-

sponding fertility in the region adjacent to the southern coast. The dry season extends from December to March, when hot winds are frequent and the temperature rises to 118°. It seldom falls to 32°, but the climate is singularly healthful. At Adelaide the rainfall is 24 inches and in the northern part it is more abundant, ranging from 50 to 70 inches.

The coast regions are moderately timbered with string bark, gum, pine, eucalyptus, and other trees, but in the interior regions forests are either absent or limited. The State possesses little value for agricultural purposes aside from the southern and extreme northern regions, but it has excellent ranges for grazing. Water is not obtainable in some sections, and a supply of rain water is preserved in cisterns for use in the dry season. In some localities many artesian wells abound and are utilized to some extent for irrigation.

INDUSTRIES. Mining is not as important as in some of the other Australian states. Very rich deposits of copper occur and the mining of this metal is more extensive than that of any other. The absence of coal has made it impossible to work the deposits of iron ore, in which the State is rich. Other minerals include gold, lead, bismuth, granite, and limestone. The fisheries on the coast are extensive, especially in Spencer Gulf and the Gulf of Saint Vincent. The manufactures are confined largely to products that are consumed locally and include flour, machinery, canned fruits, pottery, and clothing. Flour is the chief manufactured product and large quantities are exported. Other exports include wheat, wool, wine, minerals, and live stock.

Agriculture is the principal occupation. In the acreage under cultivation South Australia ranks second among the states of the Commonwealth, but the farming district is chiefly in the southern part. Tracts of considerable size are irrigated by drawing water from rivers and artesian wells. Wheat is the principal cereal and exceeds in acreage all other crops combined. The products next of importance are hay, barley, oats, potatoes, and fruits, especially grapes, oranges, and lemons. Silk culture and the mulberry tree have been introduced successfully. South Australia has large interests in raising sheep, of which there are 5,500,000 head. Other domestic animals include cattle, horses, swine, and poultry.

GOVERNMENT. The Governor is appointed by the British crown and is aided by an executive council of six members. Two chambers are included in the Legislature, consisting of the legislative council, of 18 members, and the house of assembly, of 42 members. All are elected by the people, the former for six years and the latter for three years. The right of suffrage is vested in all without regard to sex, but a small property qualification is required. A commissioner chosen by the State has administrative authority in the Northern Territory.

The State maintains a system of public schools, at which attendance is free and compulsory between the ages of seven and thirteen years. Many secondary schools are well established, but these are either private or denominational. The schools culminate in the University of Adelaide, which has extensive courses and adequate facilities. Technical and industrial schools receive aid from the State.

The public utilities are largely owned and controlled by the State or by municipalities. Telegraph and telephone lines, including a telegraph system between Adelaide and Fort Darwin, as well as the postal system, are owned by the government. Farmers are aided by loans on easy terms, and industrial disputes are settled largely by arbitration. Railroad building has been encouraged, but the lines are confined to the southern part. The principal railway extends from Adelaide north to a point on the Macuba River, passing in its course the southern shore of Lake Eyre. At present 2,500 miles are in operation.

INHABITANTS. The settlements are confined almost entirely in the southeastern part of the State. At the last census only 3,310 persons resided in the Northern Territory, exclusive of 1,223 aborigines. Nearly all the people are of British origin, chiefly English and Scotch, and those of foreign birth are largely Germans. In religious affiliation the people are Anglican, Methodist, Roman Catholic, Lutheran, Baptist, and Presbyterian, in the order named. Adelaide, on the Gulf of Saint Vincent, is the capital and largest city. Port Darwin is the capital of the Northern Territory. Other cities include Mount Gambier, Port Adelaide, Port Pirie, and Palmerston, the last mentioned being a port city on the northern coast. Population, 1921, 495,336.

HISTORY. Navigators from Holland, Spain, and Portgual visited different sections of the coast at various times in the 16th and 17th centuries. The first English settlement was made in the vicinity of Port Adelaide, a short distance northwest of Adelaide, in 1836. Adelaide, on the Torrens River, soon after became the capital of a prosperous colony, which attracted many emigrants by the discovery of copper in 1843. With the discovery of gold in Victoria, in 1851, a large number of colonists left the settlement, but the development of pastoral and agricultural interests rapidly increased the population. South Australia became a constitutional colony in 1856, after which the interior was explored. The Northern Territory was annexed in 1863. In 1900 it joined the federation of the Commonwealth of Australia.

SOUTH BEND, a city in Indiana, county seat of Saint Joseph County, on the Saint Joseph River, 85 miles southeast of Chicago, Ill. It is on the Grand Trunk, the New York Central, the Pennsylvania, the Michigan Central, and other railroads. The surrounding country is fertile, producing fruits and cereals. Among the note-

worthy buildings are the county courthouse, the city hall, the high schools, the Y. M. C. A. building, the Federal building, the Oliver Hotel, the Saint Joseph's Academy, the University of Notre Dame, the public library, and the Epworth and Saint Joseph hospitals. The works of the Oliver Plow Company and of the Studebaker Automobile Company are located in South Bend. Among the manufactures are automobiles, farming machinery, woolen goods, sewing machines, furniture, flour, paper, machinery, hardware, tobacco products and brick. It has a large wholesale jobbing trade. The Saint Joseph River furnishes an abundance of water power and is navigable for small craft to South Bend. The place was platted in 1831 and became a city in 1865. Population, 1900, 35,999; in 1920, 70,883.

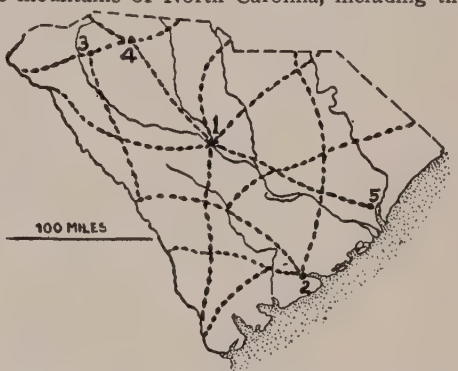
SOUTH BETHLEHEM (bĕth'lĕ-hĕm), a borough of Pennsylvania, in Northampton County, on the Lehigh River, opposite Bethlehem. It is on the Lehigh Valley and the Philadelphia and Reading railroads. Among the noteworthy buildings are the Lehigh University, founded by Asa Packer in 1865. Other features include the high school, the public library, the Saint Luke's Hospital, the Bishop Throp Seminary for girls, and many churches. It has manufactures of silk, textiles, armor plate, engines and boilers, hosiery, flour, hardware, Bessemer steel products, ordnance, and machinery. South Bethlehem was consolidated into one city with Bethlehem in 1917. Population, 1920, 19,973.

SOUTHBRIDGE, a town of Massachusetts, in Worcester County, on the Quinebaug River, 30 miles east of Springfield. Communication is furnished by electric railways and by the New York, New Haven and Hartford Railroad. The surrounding country produces fruits, cereals, and vegetables. The features include the public library and the Y. M. C. A. building. It has manufactures of cutlery, bread, cotton and woolen goods, boots and shoes, hats and caps, optical instruments, and machinery. The place was separated from Charleston in 1801 and incorporated in 1816. Population, 1925, 15,489.

SOUTH CAROLINA (kăr-ō-lī'nà), a southern State of the United States, one of the original thirteen states, popularly called the *Palmetto State.* It is bounded on the north and northeast by North Carolina, southeast by the Atlantic, and southwest by Georgia. In shape it is triangular, with a base of 190 miles fronting the ocean and an apex extending inland 240 miles. A number of small bays indent the coast, including Bull's Bay, Saint Helena Sound, and Port Royal Sound. The area is 30,570 square miles, of which 400 square miles are water surface.

DESCRIPTION. The surface is divided about equally into the coastal plain along the ocean and the Piedmont plain lying inland. From the northern boundary to Winyah Bay the coast is rather low and sandy, but farther south it is higher and broken by inlets and estuaries. In the northwest are ridges of the Blue Ridge Mountains, which rise to elevations ranging from 2,500 to 3,350 feet. Mount Pinnacle, the highest summit in the State, has an elevation of 3,336 feet above sea level. From the highlands the surface slopes gradually toward the southeast, forming the coastal plain with a width of 100 miles. This section is less than 500 feet above the sea and has a light sandy soil, forming low, marshy, and swampy regions along the coast, especially near the mouths of the rivers.

All of the drainage is toward the southeast into the Atlantic. The larger streams rise in the mountains of North Carolina, including the



SOUTH CAROLINA.

1, Columbia; 2, Charleston; 3, Greenville; 4, Spartanburg; 5, Georgetown. Chief railroads indicated by dotted lines.

Great Pedee, which receives the Little Pedee and flows into the Atlantic through Winyah Bay. The Santee, formed by the Wateree and the Congaree, drains the central part of the State. It is connected by the Santee Canal with the Cooper River, which flows into Charleston harbor. The southwestern boundary is formed by the Savannah, which separates the State from Georgia. Across the Piedmont plain the streams flow rapidly, from which they pass over the fall line into the coastal plain, where they are wide and sluggish. Steamers ascend the larger streams to the fall line.

The State has a mild and healthful climate. Snow rarely falls in the interior and never on the coast, but frequently in the highlands. All sections have an abundance of precipitation, ranging from 40 to 60 inches. At Charleston the temperature is 65° and the average for the State is 61°. In January the mean temperature is 44° and in July it is 79°, while the maximum ranges from 100° in the highlands to about 106° in July. Storms sometimes sweep across the coastal plain.

MINING. The State has vast deposits of granite and limestone and considerable quantities of gold, silver, lead, copper, phosphate, and iron ore. Clay products and phosphate rock rank highest in value, the latter being used extensively in the manufacture of fertilizers. The total output of the mines and quarries is $3,125,000, of which about one-third is represented by granite. Coal is mined in the northwestern part

of the State and mineral waters are obtained for commercial purposes in the highlands.

AGRICULTURE. About 75 per cent. of the land is included in farms, which average 90 acres, and more than half of the holdings are worked by Negroes. The soil is exceedingly fertile in the central section, and the coastal plain contains an extensive area of rice lands. Rice culture was introduced from Madagascar as early as 1693, and the quality grown is the finest in the market. Cotton is the chief product, the annual yield being about 875,500 bales. A large part of the product is sea-island cotton, which yields profitably along the coast, and the quality produced is of a high grade. Other products include corn, wheat, oats, potatoes, hay, tobacco, and many species of fruit, such as oranges, lemons, peaches, pears, apples, grapes, and pomegranates. Hops, flax, sorghum, and broom corn are grown quite extensively. Stock raising is a profitable enterprise. Cattle are raised both for meats and dairy products. Other live stock includes swine, horses, mules, sheep, and poultry.

MANUFACTURES. The State has grown rapidly in manufacturing enterprises since 1880. It has much water power and an abundance of raw materials. The forests yield large quantities of cypress, hickory, beech, sycamore, walnut, magnolia, and other species that are valuable for construction purposes. Cotton goods comprise the principal output, and in this manufacture the State holds second rank in the South and second in the Union. Fertilizers, flour, lumber and timber products, cotton-seed oil and cake, turpentine and rosin, pipe tobacco and cigars, clothing, and machinery are produced in large quantities. The fisheries yield material for curing and canning, such as the shad, bass, whiting, and oysters.

COMMERCE AND TRANSPORTATION. Charleston is the principal port and is the center of a large foreign trade. However, the larger commercial interests are coastwise and inland. All of the larger streams are navigable to the fall line, such as the Pedee, the Santee, and the Savannah, and they have been improved to a considerable extent by the removal of obstructions and the construction of canals. The Southern, the Atlantic Coast Line, and the Seaboard Air Line are the principal railroads. Charleston, Columbia, Sumter, and Greenwood are the leading railroad centers. The total steam railroad lines aggregate 4,050 miles. Electric railways are operated in the cities and some of the interurban districts.

GOVERNMENT. The present constitution was adopted in 1885. It vests the chief executive authority in the governor, lieutenant governor, secretary, attorney-general, treasurer, comptroller-general, adjutant and inspector-general, and superintendent of education, all being elected by popular vote for two years. Legislative authority is vested in the Legislature, which consists of two branches, the senate and the house of representatives. Each county is represented in the upper branch by one senator. Representation in the lower house is based upon population, the present number being 24 members. Both senators and representatives are elected by the people, the former for four and the latter for two years. Four judges, one known as the chief justice and the other three as associate justices, constitute the supreme court. They are elected for terms of eight years by the General Assembly. The State is divided into judicial districts, each having a court of general session and a court of common pleas, and the judges of these are appointed for four years by the General Assembly. Local government is exercised by townships, municipalities, and counties.

EDUCATION. The State has made noticeable advancement in education the past two decades, although more than half the population consists of Negroes. In 1900 the rate of illiteracy was 18.1 per cent. based on the total population, while among whites alone it was 6.5 per cent., and among the colored population it was 29.3 per cent. The public schools are separate for whites and Negroes, both being supported in part by a State school tax and in part by local taxation. They are under the direction of a State board of education, which has the power to appoint the county boards, and the latter boards appoint the trustees in the respective districts. High schools are maintained in the towns and cities. Normal instruction is given to teachers by the State at the Winthrop Normal and Industrial College, in Rock Hill.

The University of South Carolina, which is at the head of the public school system, consists of the Winthrop Normal and Industrial College at Rock Hill, the University of South Carolina, at Columbia, the Clemson Agricultural College at Calhoun, a military academy at Charleston, and departments of medicine and pharmacy at Charleston. Among the other leading institutions of higher learning are the Lutheran Newberry College, Newberry; the Allen University, Columbia; the Presbyterian College, Clinton; the Furman University, Greenville; the Claflin University, Orangeburg; the Erskine College, Due West; and the College of Charleston, Charleston. The leading State institutions are located at Columbia, including the penitentiary, the orphan asylum, the hospital for the insane, and the institution for the deaf and dumb.

INHABITANTS. The number of persons to the square mile is about 55, and the foreign-born population is very small, only 6,401. Since 1820 the colored inhabitants have outnumbered the whites. Columbia, on Broad River, is the capital. Other cities include Charleston, Greenville, Spartanburg, Camden, Sumter, and Anderson. In 1900 the State had a population of 1,340,316. Of this number 782,509 were col-

ored, including 67 Chinese, 121 Indians, and 782,321 Negroes. Population, 1920, 1,683,662.

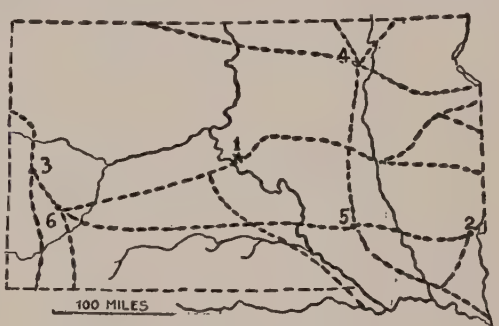
HISTORY. The Spaniards first explored the coast of South Carolina in 1525 and named the region Chicora. A party of French Protestants under John Ribault made the first settlement near Beaufort in 1562, naming the place Port Royal. The colonists soon abandoned their enterprise of colonization and returned to France. The next attempt at settlement was made by a party of English under William Sayle, who located at Port Royal in 1670, but ten years later removed to the present site of Charleston. Charles II. made a grant of the territory to colonists who attempted to set up the feudal system under a constitution called the Grand Model, but the region was divided by George II. into North and South Carolina in 1724, when the latter became a royal colony. The State adopted its first constitution in 1776, when it gave vigorous support to the Revolution and was the scene of numerous internal disturbances, owing to the presence of many Tory sympathizers. Sir Henry Clinton captured Charleston and battles were fought at Eutaw Springs and Camden. The State was among the first to ratify the national Constitution, which it did on May 23, 1788, by a vote of 149 to 73. The tariff laws of 1828 caused many citizens to take part in a convention at Columbia in 1832, which nullified those laws, but the nullification ordinance was repealed after Henry Clay's compromise tariff was passed in 1833.

South Carolina seceded from the Union on Dec. 20, 1860, being the first to take the step, and on April 12, 1861, the first gun was fired on Fort Sumter. It was readmitted on June 25, 1868, having previously adopted a revised Constitution. In 1886 a severe earthquake destroyed much property in the vicinity of Charleston. The South Carolina and West Indian Exposition was held at Charleston in 1901 and 1902. Prohibition gained a wide foothold within the last decade, but a majority of the people appear to favor local option. The Legislature has adopted several measures to encourage immigration.

SOUTH CAROLINA, University of, an educational institution of higher learning in Columbia, S. C., established in 1801. It was opened for instruction in 1805, but was closed for a brief time on account of the Civil War. In 1878 it was reorganized into two branches, the South Carolina College, for whites, at Columbia, and the Claflin University, for Negroes, at Orangeburg. It was made coeducational in 1894. The divisions include law, education, commerce, pharmacy, engineering, journalism, extension, and arts and sciences. With it are affiliated a number of accredited schools, from which students are admitted without examination. It has a library of 80,000 volumes, a faculty of 72 instructors, and an attendance of 1760 students.

SOUTH CAROLINA EXPOSITION, an exhibition held in Charleston, S. C., known officially as the South Carolina Interstate and West Indian Exposition. It was opened on Dec. 1, 1901, and closed on June 2, 1902. Many states of the Union and a number of foreign countries were represented by buildings or exhibits. The purpose was to demonstrate the industrial progress and commercial possibilities of the South and the countries of Central America, South America, and the West Indies. It was officially reported that 675,000 persons attended.

SOUTH DAKOTA (dȧ-kō'tȧ), a northwestern State of the United States, popularly called the *Sunshine State*. It is bounded on the



SOUTH DAKOTA.

1, Pierre; 2, Sioux Falls; 3, Lead; 4, Aberdeen; 5, Mitchell; 6, Rapid City. Chief railroads indicated by dotted lines.

north by North Dakota, east by Minnesota and Iowa, south by Nebraska, and west by Wyoming and Montana. The length from east to west is 370 miles and the breadth is 223 miles. A part of the southern boundary is formed by the Missouri River, which separates the southeastern part from Nebraska. The Big Sioux River forms a part of the boundary between it and Iowa. It is separated from Minnesota partly by Lake Traverse, the Minnesota River, and Big Stone Lake. The area is 77,615 square miles, which includes 747 square miles of water surface.

DESCRIPTION. The general slope of the eastern part is toward the south, the western inclines toward the east, and through the central part extends the low depression of the Missouri River, which slopes toward the south. All of the State lies within the region of the Great Plains. The elevations range from 1,350 feet in the southeast to 3,000 feet in the west. A narrow belt along the shore of Lake Traverse is less than 1,000 feet, while Harney Peak, the culminating summit of the Black Hills, has an altitude of 7,216 feet. The surface of the eastern part is a gently undulating plain, the region west of the Missouri is considerably diversified by ranges of hills, and in the western part are the Black Hills. These mountains lie on the boundary between South Dakota and Wyoming,

extending into the State about 100 miles. In the southwestern part are the so-called Bad Lands, which consist of denuded bluffs and hills, through which deep ravines have been cut by the action of streams. The plateau known as the Coteau du Missouri extends into the State from North Dakota and forms an elevated region between the Missouri and the James rivers. Another plateau, known as the Coteau des Prairies, extends into the State from Minnesota and occupies the region lying in the northeastern part, between the James River and the Minnesota boundary. The eastern half of the State is generally fertile, interspersed in localities by sandy tracts, but the character of the soil west of the Missouri is greatly diversified. Here many buttes and irregular ridges characterize the surface, but large tracts and the valleys are fertile, and fine grazing lands abound even in the most arid regions.

Most of the drainage belongs to the Missouri, which traverses the State from the central part of the northern boundary to the southeastern corner. It has a comparatively narrow valley, from which bluffs rise from 150 to 300 feet, merging into the level plains beyond. From the west it receives the inflow from the White, Cheyenne, Moreau, and Grand rivers, but the volume carried by these streams is comparatively small in consideration of the large areas drained. The Keya Paha River crosses the boundary into Nebraska and joins the Niobrara. The eastern part is drained principally by the James River, or Dakota River, which enters the State from North Dakota and discharges into the Missouri a short distance below Yankton. East of it is the Vermilion River and on the Iowa border is the Big Sioux. Numerous small lakes of glacial origin are in the eastern part, of which Big Stone and Traverse, on the Minnesota border, are the most important. A ridge separates Lake Traverse from the Minnesota River, hence this lake and a small tract in the northeast corner are located in the valley of the Red River of the North.

South Dakota has a singularly healthful and invigorating climate and is noted for its large number of bright days. The extremes are quite marked, ranging from 40° below zero in the higher altitudes during the winter to 108° in summer. In January the mean temperature is 15° and in July it is 73°. Blizzards laden with fine floating snow blow across the State in winter, but the snowfall is not heavy. The rainfall ranges from 20 to 30 inches in the eastern part to 15 to 20 inches in the west, where irrigation is employed to some extent. The summers are pleasant, the nights are cool, and the autumns are particularly beautiful. The State is largely a treeless prairie country, but forests are found along the streams and in the Black Hills, and many tracts of timber have been planted. Among the forest trees are the elm, ash, maple, cottonwood, and box elder, in the valleys, and the Black Hills region has a good growth of pine and cedar.

MINING. The mineral wealth is confined chiefly to the Black Hills, where gold, silver, copper, nickel, manganese, and graphite are found. Gold is the principal product from the mines and represents a value of $6,021,259 out of a total of $6,597,237. Lignite coal occurs in veins of considerable extent in the northwestern part of the State, but the output is not sufficient to supply the demand for local consumption. Clays of commercial value are abundant, suitable for the manufacture of brick and pottery. Limestone, granite, and sandstone are quarried for building and other economical purposes. Mineral waters are found in the Black Hills, especially at Hot Springs, which is noted as a health resort, owing to its thermal and richly laden mineral waters.

AGRICULTURE. Though irrigation must be resorted to in some sections of the State, agriculture is the leading industry. The eastern part has ample rainfall for all classes of farming, while the irrigated region is confined to the western section, where the water is drawn from the White and the Cheyenne rivers and their tributaries. About 50 per cent. of the area is included in farms, which average 362 acres, and only 20 per cent. is rented. Corn is grown on a larger acreage than any other cereal and a comparatively large extent is devoted to the growth of hay and forage. The cultivation of wheat, though most extensive in the eastern part, has grown in favor very rapidly. Other crops grown extensively include barley, oats, rye, flaxseed, potatoes, garden vegetables, and fruits, including chiefly apples, plums, and cherries. Large areas, especially in the west, are devoted to grazing, but the larger ranches are fast giving way to mixed farming. The State has extensive interests in growing cattle, both for meat and dairying, and the breeds are generally of a high order, such as Shorthorn, Holstein, and Hereford. Large numbers of horses, swine, and sheep are exported. Poultry is grown very extensively; the returns per year from chickens aggregate $19,000,000.

MANUFACTURES. Considerable progress has been made the past decade in the output of manufactures, which consist largely of products obtained from raw materials of the farm and mines. Flour is produced in large quantities and this is true likewise of butter, cheese, bread and brick. Large interests are vested in printing and publishing, notably at Sioux Falls and Aberdeen. Other products include Portland cement, cured and packed meats, clothing, earthenware, cement blocks, and monuments.

COMMERCE AND TRANSPORTATION. Large quantities of cereals, minerals, and live stock are exported. The tendency is to increase manufacturing within the State, with the view of employing labor and building up the wealth of local communities. Textiles and farming ma-

chinery are imported extensively. Although the Missouri is navigable in its entire course through the State, it is not used extensively for that purpose. Railroad building has received marked attention since 1880, and at present the State has 4,250 miles in operation. Two lines cross the State from east to west, those of the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul. Both these companies have lines crossing the eastern part of the State from north to south, while the transcontinental line of the latter crosses the northeastern part and enters North Dakota on the west side of the Missouri. Other lines within the State are the Great Northern, the Illinois Central, the Chicago, Rock Island and Pacific, the Minneapolis and Saint Louis, and the Chicago, Burlington and Quincy. Many highways have been improved by grading and the building of bridges.

GOVERNMENT. The constitution was adopted when the State was admitted into the Union, in 1889. It vests the chief executive power in the governor, lieutenant governor, secretary of State, auditor, treasurer, attorney-general, commissioner of schools and public lands, and superintendent of public instruction, all elected for two years. Five judges constitute the supreme court, all elected for four years. The State is divided into judicial districts, each presided over by a judge elected for four years. For the purpose of local government the State is divided into counties, which are again divided into townships. Local government is administered through the township, municipal, and county authorities.

EDUCATION. The State takes high rank intellectually, only 1.7 per cent. of the people over ten years of age being illiterate. A State superintendent of public instruction, elected by the voters, has general supervision of the schools, but he is aided by city and county superintendents. The towns and cities maintain high schools by local taxation, based upon both personal and real property, and the common schools are supported by State and local aid. Aberdeen, Madison, Spearfish and Springfield have normal schools. The State University, situated at Vermilion, is at the head of the system of education. Other State institutions include an agricultural college at Brooking and a school of mines at Rapid City. Among the leading denominational and private schools are the Augustana College, Sioux Falls; the Dakota Wesleyan University, Mitchell; the Huron College, Huron; the Redfield College, Redfield; the Yankton College, Yankton; and the Sioux Falls College, Sioux Falls.

Yankton is the seat of the State insane asylum, Hot Springs has a soldiers' home, and Gary contains an institution for the blind. The reform school is located at Plankinton and the State prison is at Sioux Falls. Canton has an asylum for insane Indians.

INHABITANTS. The State has grown rapidly in population, owing largely to its extensive region of fertile lands open for settlement or sale under favorable conditions. About one-fifth of the inhabitants are of foreign birth, including principally Germans, Scandinavians, and Russians. The Lutherans are the strongest religious denomination. Pierre, on the Missouri, is the capital. Other cities include Sioux Falls, Lead, Yankton, Aberdeen, Huron, Mitchell, Deadwood, and Watertown. In 1900 the population was 401,570. This number included a total colored population of 20,856, of which 465 were Negroes and 20,225 Indians. Population, 1907, 472,734; in 1925, 681,260.

HISTORY. South Dakota was acquired as a part of the Louisiana Purchase in 1803, but was under British rule prior to the settlement of the boundary between the United States and Canada. The Lewis and Clark expedition ascended the Missouri in 1804-06, and soon after fur trading posts were established. A treaty with the Dakota Indians opened the region to settlers in 1851. The first permanent settlement was made at Sioux Falls in 1857. In 1861 the Territory of Dakota was organized by the government, with the capital at Yankton, but the seat of government was removed to Bismarck in 1883. A division was made in 1889, when South Dakota was admitted as a State into the Union, and Pierre became the capital. The State has promoted a policy of vast improvements, including 2,500 miles of surfaced highways and five great bridges across the Missouri river.

SOUTH DAKOTA, University of, an educational institution at Vermilion, S. D., organized on a coeducational basis in 1882. It was established as a territorial institution under the name of the University of Dakota, but its name was changed when the Territory was divided into North and South Dakota. As an endowment it received 86,000 acres of public land, which has been sold or leased as a means of support. Courses are maintained in law, music, commerce, collegiate branches, civil and mechanical engineering, classics, literature, military science and tactics, and geological surveying. The property of the University has a value of $375,000. It has a library of about 65,000 volumes. The faculty includes 90 professors and instructors, and there is an average attendance of about 1,100 students.

SOUTHERN CROSS, an interesting group of stars in the Southern Hemisphere, including four stars of the first magnitude. Good views of it may be taken at the Tropic of Cancer, but its aspect is considerably better farther south. The four principal stars form a cross, two of them pointing directly east and west, while the upper and lower ones point to the South Pole. The Southern Cross is a less striking configuration than the Great Bear, but it is equally interesting from the circumstance that in the different seasons of the year the hour of

the night is indicated by the position it assumes.

SOUTHEY (south'ĭ), **Robert,** poet and miscellaneous writer, born in Bristol, England, Aug. 12, 1774; died March 21, 1843. He was the son of a draper and, after attending several private schools, entered Oxford University. It was at first intended that he should take orders for the church, but, coming in contact with Coleridge, he departed from the orthodox standards, and in 1792 was dismissed for writing a paper on school punishments, which he had published in *The Flagellant.* Subsequently he was readmitted and remained at Oxford until 1794, and soon after published a small volume of poems. Afterward he devoted himself wholly to literature and, after he and Coleridge married sisters, settled in a country home near Keswick. By his prolific pen he was able not only to support his own family, but to assist in supporting the household of Coleridge. His library was enlarged to 14,000 volumes, and he devoted himself to reading and writing with almost mechanical regularity.

Southey was made poet laureate in 1813, but shortly after refused a baronetcy, though in 1835 he accepted a government pension of $1,500 annually. His general writings include 109 volumes, but besides these he contributed 52 articles to the *Annual Review,* three to the *Foreign Quarterly,* and 94 to the *Quarterly.* The poetic writings of Southey contain many exaggerations and some of the scenes are unreal, but his prose is remarkable for evidence of thorough research and an excellent style. The principal works in prose embrace "Life of Nelson," "Lives of British Admirals," "History of the Peninsular War," "History of Brazil," "Book of the Church," and "Life of Wesley." Among his poetic works are "Joan of Arc," a juvenile production, "The Curse of Kehama," "Roderick, the Last of the Goths," "Battle of Blenheim," and "How the Water Comes Down at Lodore."

SOUTH HADLEY (hăd'lĭ), a town of Massachusetts, in Hampshire County, three miles northeast of Holyoke. It is on the Connecticut River, which has a fall of forty feet at this place, and is near the Boston and Maine and other railroads. Electric lighting, sewerage, and a public library are among the utilities. It is noted as the seat of Mount Holyoke College, the oldest collegiate institution for women in the United States. The manufactures include brick, fertilizers, cotton and woolen textiles, and lumber products. Population, 1925, 6,609.

SOUTH McALESTER (măk-ăl'ĭs-tẽr), a city of Oklahoma, in Pittsburg County, 85 miles southwest of Fort Smith, Ark. It has transportation facilities by the Missouri, Kansas and Texas and the Chicago, Rock Island and Pacific railroads. Electric railways extend to a number of points in the eastern part of the State. The surrounding country produces large quantities of cotton, fruit, and bituminous coal. Among the manufactures are coke, brick, flour, cigars, and machinery. It has a public library, a number of fine schools and churches, and many substantial business blocks. McAlester and South McAlester were united in 1907 as the city of McAlester. Population, 1920, 19,398.

SOUTH MILWAUKEE (mĭl-wą'kẽ), a city of Wisconsin, in Milwaukee County, ten miles south of Milwaukee, on the Chicago and Northwestern Railway. It has manufactures of steam dredges, hardware, clothing, and machinery. The chief buildings include several public schools, a number of churches, and numerous business houses. Electric lighting and waterworks are among the public utilities. Population, 1905, 5,284; in 1920, 7,598.

SOUTH MOUNTAIN, Battle of, an engagement of the Civil War in the United States, fought at South Mountain, near Sharpsburg, Md., on Sept. 14, 1862. General Lee had invaded Maryland with a large army and was stationed near Turner's Gap with 18,000 men, where he was attacked by 28,000 Federals from McClellan's Army of the Potomac. After a stubborn resistance, the Confederates were compelled to retreat, losing 2,600 men, while the Federals lost 1,800. They fell back to Antietam (q. v.), where another battle was fought two days later.

SOUTH NORWALK (nôr'wąk), a city of Connecticut, in Fairfield County, fourteen miles southwest of Bridgeport. It is located at the mouth of the Norfolk River, on Long Island Sound, and has communication by the New York, New Haven and Hartford Railway. The site is on elevated ground overlooking the sound, hence its location is both pleasant and healthful. The harbor is extensive and carries a large coastwise trade. Clothing, boots and shoes, hardware, and machinery are among the leading manufactures. It has waterworks, electric lighting, and a public library. Oyster fishing and shipbuilding are carried on extensively. It was chartered as a city in 1870. Population, 1900, 6,591; in 1920, 8,968.

SOUTH OMAHA (ō'mȧ-hą), a section of Omaha, Nebraska, situated in the south part of the city, on the Union Pacific, the Chicago, Rock Island and Pacific, the Chicago, Burlington and Quincy, and the Missouri Pacific railroads. Communication within the city and with Omaha is maintained by electric railways. The noteworthy buildings include the high school, the public library, the post office, and many churches. It is particularly noted on account of its extensive stock yards, meat-packing houses, rendering tanks, and trade in cured meats. The hog-slaughtering industry takes third rank in the United States. It has systems of sewerage, waterworks, and electric and gas lighting. South Omaha has had a remarkable growth the past decade. It ranks fourth in pork-packing, being exceeded only by St. Louis, Kansas City, and Chicago. The place was settled in 1882 and

annexed to Omaha in 1915. Population, 1900, 26,002; in 1920, 36,259.

SOUTH ORANGE, a village of New Jersey, in Essex County, fifteen miles west of New York City. It is on the Delaware, Lackawanna and Western Railroad and has connections by electric lines with other points in the State. The site is on elevated ground facing Orange Mountain, hence it is popular as a residential center for Newark and New York business men. Among the features are Seton Hall College, the public library, the townhall, and several fine schools. It has a large local trade and manufactures of clothing and machinery. The first settlement was made in 1670. Population, 1905, 4,932; in 1920, 7,274.

SOUTH POLAR EXPLORATIONS. See **Polar Expeditions.**

SOUTHPORT (south'pôrt), a borough of England, in Lancashire, eighteen miles north of Liverpool. It is situated at the mouth of the Ribble Estuary, on the Irish Sea, and is popular as a watering place. Besides many public buildings and institutions, it has an art gallery, a public library, and winter gardens. The manufactures include clothing, earthenware, and machinery. Electric street railways, gas and electric lighting, waterworks, and pavements are among the public improvements. The place was first platted in 1830. Population, 1921, 51,650.

SOUTH PORTLAND (pōrt'lạnd), a city of Maine, in Cumberland County, on Casco Bay, opposite Portland. It is connected with Portland by four bridges and electric railways and has communication by the Boston and Maine Railroad. The manufactures include hardware, boats, furniture, and clothing. It is the seat of a State school for boys, has a fine soldiers' monument, and is protected by government fortifications. Formerly it was a part of Cape Elizabeth, but was organized as South Portland in 1895. Population, 1920, 9,254.

SOUTH SEA SCHEME (skēm), a plan originated by Robert Harley, Earl of Oxford, in 1711, with the view of securing the payment of the debt of England, which at that time aggregated $50,000,000. An amount equal to the debt was loaned to the government by a number of merchants, who were guaranteed an annual payment of 6 per cent. interest. They were given a monopoly of the South Sea trade and the right to collect certain customs. The popular idea that enormous riches could be obtained in South America caused the stock to rise with remarkable rapidity until it reached $5,000, but a collapse came when certain stockholders transferred their interest to others. It was found that fictitious stock to the amount of $6,300,000 had been authorized, of which about one-half had been sold. To reimburse the heavy losers the government confiscated the property of the directors and remitted an amount equal to $35,000,000 due the government. Though this course provided a small measure of relief, it did not by any means repay those who had been induced by glowing promises to invest their money.

SOUTH SHIELDS. See **Shields, South.**

SOVEREIGN (sŭv'ĕr-ĭn), a gold coin of Great Britain, the standard of value, representing the pound sterling. It is equivalent to twenty shillings, or about $4.86, and was first coined in 1817, when it began to supersede the guinea. The sovereign weighs 123.274 grains troy. See **Pound.**

SOVEREIGNTY, in government, the state of being sovereign, that is, having independent and supreme authority. The term is used in two different senses in relation to the power of a state or nation, these implying that internal as well as external sovereignty may be exercised. By *internal sovereignty* is meant the power of the state over its citizens, which is absolute and indivisible, that is, the state cannot be limited, except by its constitutions and laws, in exercising prerogatives over its citizens; and its authority cannot be divided so as to permit one or more other sovereigns to exercise the functions of government over its members. *External sovereignty* has reference to affairs with other nations, such as concluding treaties, declaring war, negotiating peace, and exercising powers relating to its internal affairs. While a sovereign state is absolutely independent in theory, it is more or less dependent in fact, since no political state can exist without taking cognizance of other nations.

SOWING MACHINE (sō'ĭng mȧ-shēn'), an implement for sowing the seed of grasses and cereals, such as are grown by agriculturists and gardeners. In the early stages of farming the seed was scattered by means of the hand, the sower carrying a supply of seed in a bag or box suspended from the shoulder. Subsequently devices were placed on the market that enabled the sower to scatter the seed by carrying a mechanical device, but this was soon superseded by machines mounted on wheels to be drawn by horses. Still later implements were manufactured that scattered the seed and at the same time cultivated the soil, small steel shovels being attached beneath the box for that purpose. They are of two kinds, known as *drill* and *broadcast* seeders. The former sow the seeds in rows, while the latter scatter them uniformly.

A machine with a funnel to hold the grain, having a disc operated by means of a chain connected with the wheel of a cart, has come into wide use. Most of the farmers who cultivate large fields attach a device of this kind to the box of a common wagon, the propelling force being supplied by a rim attached to one of the hind wheels. The seed to be sown is placed in the wagon and the operator places the grain in the funnel as required, while the driver at the front end of the wagon attends to the team so a uniform speed may be maintained in mov-

ing across the field. Machines of this kind are usually called *broadcast seeders.* By means of a single machine twenty to thirty acres may be sown in a single day, though a moderately high wind interferes with the uniformity in scattering the seeds, this depending somewhat upon the character of the grain sown.

SOW THISTLE, a genus of plants native to the Eastern Hemisphere, of which about thirty species have been described. The *common sow thistle* is two or three feet high, bears small yellow flowers, and is a branching plant. Another species is known as the *field sow thistle,* which is an obnoxious weed in richly cultivated land. Several of these plants have been brought to Canada and the United States with shipments of seeds, and have developed into injurious plants, similar to the Canada thistle.

SPAHIS (spä'hēz), the name applied in Algeria to a class of cavalry, consisting of natives. It was organized to supersede the regular cavalry in 1796, and has been maintained since the French conquered that country. Cavalrymen belonging to the spahis carry such weapons as the javelin, lance, and saber. The uniform is similar to that of the Arabs. In British India the name *sepoys* has reference to a similar class of native troops.

SPAIN (spān), a kingdom in the southwestern part of Europe, occupying about six-sevenths of the Iberian peninsula. It is bounded on the north by the Bay of Biscay and France, east by the Mediterranean, south by the Mediterranean, the Strait of Gibraltar, and the Atlantic, and west by Portugal and the Atlantic Ocean. From France it is separated by the Pyrenees and from Africa, by the Strait of Gibraltar. The greatest extent from east to west is in the northern part, where it is 620 miles, and its extent from north to south is 540 miles. The coast line is quite regular, having no large indentations, but it has an extent of 3,120 miles. Spain proper includes the Balearic Islands, in the Mediterranean, and a tract of land on the coast of Africa with an area of thirteen square miles. The total area is 194,783 square miles, and the portion on the continent of Europe has 192,004 square miles.

Description. The surface is greatly diversified by mountains, tablelands, and valleys. The interior has a general altitude of from 1,000 to 3,000 feet above the sea, much of which is a treeless plateau sloping toward the west. Among the principal mountain chains are the Cantabrian and the Pyrenees, in the north; the Sierra de Gredos, the Sierra de Gaudarrama, and the Montes de Toledo, in the central part; and the Sierra Morena and the Sierra Nevada, in the southern part. The highest mountains belong to the Pyrenees, which in Spain include Pico de Aneto, 11,160 feet, but the highest peak in Spain is Mulahacen, 11,420 feet, in the Sierra Nevada. This peak is the loftiest summit of Europe outside of the Alps. Other mountain heights range from 5,275 to 8,500 feet, the latter being the elevations in the Cantabrian Mountains. Between many of the mountain ranges are deep and narrow valleys, which are drained by rapid streams, and many of the ranges are very difficult to traverse.

The drainage is chiefly toward the west, but some of the important rivers flow eastward into the Mediterranean. No streams flow directly north, owing to the fact that the Cantabrian Mountains form a watershed near the Bay of Biscay. The principal rivers flowing into the Mediterranean are the Ebro, the Júcar, and the Segura. The Guadalquiver flows southwest and discharges into the Atlantic. The Guadiana, the Tagus, and the Douro rise in Spain and flow through Portugal into the Atlantic, while the Minho forms part of the boundary with Portugal and discharges into the Atlantic on the northern frontier of that country. About 800 miles of the waterways are navigable, but only 300 miles can be used the entire year, owing to the marked effect of the dry season. The Guadalquiver, which is navigable to Seville, is the most important navigable stream. Spain has many small lakes, including Lake Albufera, but they are not important.

The climate is greatly diversified, owing to extensive variations in the altitude, and there are marked differences in the annual rainfall of the coast and interior sections. It may be said that the southern part has a semi-tropical climate, while the interior has warm summers and cold winters. In summer the temperature rises so high in the tableland that the earth becomes parched and nearly all of the rivers dry up, and in the winter this section is marked by a low temperature. In the center of the country, at Madrid, the mean temperature is 57°, but frost and snow are rare, and the summer heat frequently rises to 107°. Rainfall in the interior ranges from eight to fifteen inches per annum, but in the coast regions there is a much larger precipitation. Dry winds frequently blow from the Sahara of Africa in the summer. In the winter a cold wind, called the *Gallego,* blows from the north.

Mining. The mineral deposits of Spain are extensive and diversified. Coal is found in nearly all sections of the country, but is produced chiefly in León, Asturias, and Lérida. Almaden has the richest quicksilver mines in the world. In the output of lead it excels any other country of Europe and has inexhaustible deposits of copper, but the latter are worked chiefly by German and British capital. Extensive salt-evaporating works are maintained at Valencia and in the Balearic Islands, and rock salt deposits abound in Catalonia and New Castile. Other minerals include zinc, manganese, antimony, gold, iron, and silver.

Agriculture. The soil is singularly fertile, even in the hilly sections, but irrigation is the

basis of agriculture in most parts of the country. Farming has attained its highest development among the Basques and Catalonians. About four-fifths of the area is productive, either as grazing or farming lands, and irrigation is extending the tillable surface. About one-third of the tilled surface is under fields and gardens and the remainder is devoted to growing grasses, orchards, and vineyards. Wheat is the leading cereal. Other important crops include rye, barley, maize, rice, oats, and potatoes. The food cereals are not grown in sufficient quantities to supply the demand, hence many of the foodstuffs are imported. Spain is celebrated for the fine-fleeced merino sheep and in proportion to population it has a greater number of this class of animals than any other country of Europe. Goats are raised extensively for their flesh, milk, and skins, and some of the larger estates have as many as 3,500 of these animals. Horses of Arab stock are reared to some extent, but the mule is a more popular and numerous animal in Spain than the horse. Cattle are grown both for meat and dairying and special breeds for bullfighting are maintained. Other domestic animals include swine and poultry.

Extensive interests are vested in the southern part in growing the cork oak. The vine industry is one of wide extent, producing large quantities of grapes that are used in the manufacture of high grades of wine. Fruits of all kinds grow in abundance, especially olives, oranges, lemons, and apples, and large quantities are dried and canned. The culture of the mulberry tree and the silkworm receives marked attention, and in the production of raw silk Spain takes a high rank. Other products include cotton, sugar cane, rice, licorice, saffron, and vegetables. Though the forests have been cleared largely to obtain agricultural land, considerable oak, chestnut, willow, beech, and poplar timber still abounds.

Manufactures. At present the home demand cannot be supplied by the output of manufactures, but they are extending noticeably under encouragement by the government. Catalonia, of which Barcelona is the leading city, has greater developments in manufacturing than any other province. Here are extensive establishments for the manufacture of silk, cotton, and woolen textiles. Large interests are vested in the manufacture of leather at Cordova and the royal factories of Madrid, Seville, and Valencia have a large output of pipe tobacco and cigars. Extensive steel and iron works are maintained and efforts are being made to supply the entire home demand. The fisheries yield large quantities of cod, tunny, and sardines, much of the output being cured and canned, but the home industry does not supply the demand. Other manufactures include beet sugar, olive oil, glassware, boots and shoes, porcelain, cutlery, hardware, and machinery. Water power is utilized extensively in the manufacturing enterprises.

Commerce. Although Spain has a large foreign trade, it exports raw materials and imports manufactured articles. Fruits, wine, and minerals are the chief exports. The principal imports include lumber, cotton textiles, and machinery. Great Britain, France, the United States, and Germany have the largest share of trade in the order named. The imports exceed the exports.

Transportation. Many of the highways have been improved, but they do not compare favorably with those of France and Germany. About 10,125 miles of railways are in operation, all owned by private corporations. Electric railways are operated in the cities, whence they extend to some of the interior towns. A large share of the domestic trade is carried by coasting vessels and through canals. Telephone and telegraph systems are utilized extensively, the latter including 23,500 miles.

Government. Spain is a constitutional monarchy, the present constitution dating from 1876. It is hereditary, giving precedence to the male line of equal right. Executive power is vested in the sovereign, who has legislative functions in connection with the Cortes, the lawmaking authority. The king is assisted by a council of nine ministers, such as the ministers of foreign affairs, interior, finance, agriculture, instruction, etc. Two houses constitute the Cortes, namely, the senate and the chamber of deputies. Members in the former hold office partly by inheritance and partly by election, and in the latter they are chosen partly by popular vote. At present there are 80 who hold office by right of birth; 100, by appointment of the crown for life; and 180, by general election for five years, making a total of 360 in the senate. On the other hand, there are 406 deputies elected for five years in the chamber of deputies. In 1890 the constitution was amended to extend the right of suffrage to all male Spaniards who are 25 years of age, but a nominal property qualification maintains.

The supreme court of cessation is the highest judicial tribunal. Subordinate to it are the district courts, from which causes may be appealed to the supreme court. Local judicial authority is vested in the municipal courts and those of justices of the peace, whose decisions are subject to review by the higher courts. Each province has its own assembly, chosen by popular vote, and is subdivided into communes for the purpose of local government. Spain has a standing army of 80,000 men, but in addition there is an active military reserve. The navy is not strong when compared to the naval equipment of other countries of Europe. At present the fleet includes twelve armored vessels of large size, several protected cruisers, and a number of gunboats. The peseta is the common monetary unit, having a value of about twenty

cents in the money of Canada and the United States.

Education. Though education was formerly neglected, a better era has set in and schools are regularly inspected. A compulsory educational law was passed in 1857, requiring attendance upon elementary schools, but it has not been enforced with any degree of strictness. The rate of illiteracy is placed at 60 per cent., but it is thought that the amended compulsory law of 1902 will tend to greatly improve conditions within the next decade. Spain was unfortunately involved in colonial and foreign wars the latter part of the last century, by which the home government was deprived of many of its young men and the finances needed to promote domestic development. However, the country has entered upon a state of industrial, educational, and governmental transition that gives evidence of greater prosperity.

The Roman Catholic is the national church, but a restricted form of liberty of worship is extended to Protestants. Spain is the most Catholic country in the world. The number of non-Catholic church members may be placed at 50,000. The Catholic Church in Spain has nine archbishoprics and is divided into fifty-four dioceses. Ten universities are maintained, including those at Saragossa, Santiago, Valentia, Seville, Valladolid, Barcelona, Granada, Oviedo, Salamanca, and Madrid. The University of Madrid was founded in 1836 and is now the best equipped and attended educational institution of Spain, while that of Salamanca, greatly renowned in the Middle Ages, is at present in least repute. The government maintains schools of agriculture, engineering, commerce, fine arts, mining, and music. Besides those supported as public institutions are many private and parochial educational enterprises.

Colonies. The colonial possessions of Spain are at present confined to Africa. They include Rio de Oro and Adrar, Bata and Cape San Juan, and Fernando Póo. The total area of these possessions is 252,850 square miles, but all are sparsely populated, containing not more than 124,500 inhabitants. To these are added the Canary Islands, located about 70 miles from the northwestern coast of Africa. The colony of Rio de Oro and Adrar, on the western coast of Africa, is governed by the executive of the Canary Islands.

Inhabitants. The density of population is about 97 to the square mile. Many of the inhabitants have emigrated to Spanish-America, and there is still considerable emigration to Argentina, Brazil, and Uruguay. Madrid is the capital and largest city. Other cities of importance include Barcelona, Valencia, Seville, Málaga, Murcia, Cartagena, Saragossa, Granada, and Cadiz. Population, 1920, 19,503,068.

Language and Literature. Spanish is a Romance language. It sprang from the Latin, introduced into Spain with Roman dominion. Spanish is spoken by the people of Mexico and parts of Central and South America. The language embraces a number of different dialects, but the Castilian branch is the classic and literary form. It may be considered one of the most beautiful of European tongues and is distinguished from the Portuguese by its deep and open tones. It has twenty-seven letters and as many distinct sounds, of which six are classed as vowels.

The first writings in Spanish literature are the "Poems of the Cid," dating from the 12th century. These include a number of songs and ballads dedicated to national heroes, principally recounting the adventures of Rodrigo Diaz de Bivar. The Benedictine monk, Gonzalo de Berceo (1198-1268), published a number of didactic verses of great beauty, and soon after appeared ballads and romances of chivalry. Alfonso X. stimulated literature by encouraging writers, and in 1265 caused the publication of a Castilian code of laws known as "Las Siete Partidas." Juan Ruiz is a famous poet of the 14th century and a contemporary of Pedro Lopaz de Ayala (1332-1406), who published a number of fables, pastoral hymns, and patriotic songs and made a version of the "Dance of Death." Many of the ballads and traditions were handed from generation to generation up to the 16th century, when the second period of Spanish literature begins. This epoch marks the development of lyric poetry alongside the didactic, receiving impetus from Provençal poets who settled at the court of Barcelona. The most noted production in that century is the "Amadis de Gaula," a large work devoted to romantic chivalry.

The period from the 16th to the 18th century is the most splendid and productive in Spanish literature. Charles V. was a patron of learning. In his reign many German scholars were retained in the Spanish universities, and under him Spain became the foremost state in Europe. The conquest of Naples caused Spanish writers to study Dante, Petrarch, and other great Italian masters, thus leading to numerous translations and original works. Miguel Cervantes wrote his famous "Don Quixote" in 1605, which was received with great favor and presented in a dramatized form throughout the 17th century. Lope de Vega (1562-1635) is one of the eminent Spanish dramatists in this golden period of literature. The historians include Juan de Mariana and Diego de Mendoza and there are equally prominent writers in theology, law, science, astronomy, and geography. Spanish literature was influenced by the French at the accession of the Bourbons, and it has been extended by writers in Mexico and South American countries. The 19th century marks a period of decline in the literature of Spain, but the enactment of laws to encourage education and industrial arts is stimulating scholarship and enterprise. As a result the 20th century

promises a new epoch in its literature and the addition of many works of educational value.

History. The region occupied by Spain and Portugal was inhabited in ancient times by the Iberians, who were afterward joined by Celtic tribes. Phoenician settlements were made along the Mediterranean coast as early as 1100 B. C., when Cadiz was founded, and the Greeks soon after established several colonies. Spain was known to the ancient Greeks as *Iberia,* the name being applied in the writings of Herodotus in connection with the Phoenicians. Carthaginian invasions occurred about the middle of the 3d century. These people established a considerable commerce, but under Hamilcar Barca they subjected a large part of the peninsula to Carthage. Subsequently incursions were made under Hasdrubal and Hannibal, who greatly extended the Carthaginian influence, but soon after war began with Rome, finally resulting in the Carthaginians being expelled from Spain in 205 B. C.

The Romans generally applied the name of *Hispania* to the region, dividing the country into the northern and southern divisions, but many prolonged wars resulted before the country was finally conquered. Augustus Caesar completed the conquest in 19 B. C. Soon after the Latin language and customs were adopted and the Christian religion superseded the hero and idol worship of the Carthaginians. With the decline of Rome came successive invasions from the west and north. The Franks made a great invasion in 256 A. D., but the country continued to prosper until the early part of the 5th century, when a tide of Vandals and Alani swept over Spain, destroying many of its finest cities and carrying away its treasures.

The Visigoths established a kingdom in 418, which brought a return of general prosperity that endured until 711, when it was conquered by Arabs and Moors under Tarik, who defeated the native army at Jerez de la Frontera in July of that year. At first the government was administered by the caliphs of Bagdad and later by the caliphs of Damascus, but dissensions ultimately caused the establishment of an independent dynasty under Abd al-Rahman in 756, known as the Ommiyade dynasty, with the seat of government at Cordova. In that period the Moorish kingdom reached its greatest grandeur and Cordova became the finest city in Western Europe. Mosques and other forms of architecture were erected in the different cities. Many of the finest buildings of Moorish construction are still to be seen in different parts of Spain.

Small kingdoms began to form in various parts of Spain by the uniting of descendants from the Visigoths and early Iberians. Among the states were Aragon, León, Castile, Asturias, and Navarre, and wars for supremacy became frequent, but all united as a common enemy against the Moors. With the extinction of the Ommiyade dynasty in 1131, Mohammedan power began to decline and the two Christian states of Aragon and Castile rose rapidly. A decisive battle at Las Navas de Tolosa, in the Sierra Morena, in 1212, so reduced the Moslem influence that they retained only Granada and Cordova and from that time the Moorish influence declined rapidly. With the marriage of Isabella of Castile to Ferdinand of Aragon, in 1469, the crown of the two kingdoms became united and with this union begins the history of modern Spain. Each of the two states retained its own customs and laws, but there was a gradual fusion of the two governments, and in 1476 the *Holy Brotherhood* was formed to enlarge the powers of the central government by curtailing the power of the nobles. The *Inquisition* was founded in 1481 with the view of extending religious orthodoxy and unity. The Jews were expelled soon after and in 1492 Moorish dominion ended by the conquest of Granada. In the latter year Columbus discovered America. That noted event not only aided the country commercially, but the military power of Spain received its first great impetus, both in America and Europe. On the death of Ferdinand, in 1516, his daughter Joanna ascended the throne. She had married Philip, son of Maximilian I. of Germany, but was soon succeeded by her son, Charles I.

Charles was not only King of Spain, but also of the Netherlands, which came to him as an inheritance from his father, and in 1519 he succeeded to the throne of Germany as Emperor Charles V. He was a rigid Catholic, and his religious zeal caused him to declare war against the Turks and the Protestants of Germany and France, a course that proved a heavy tax upon the resources of his dominion. However, the addition of extensive territory to Spain enabled him to enlarge the navy and bear the burdens of long conflicts of arms. Among the most notable events of his reign are the conquest of Mexico in 1518 and of Peru in 1531, and the annexation of the Milanese and large regions in Northern Africa. He resigned all his dignities in 1556 to his son, Philip II., who gave Spain a successful internal administration, but exercised with great freeness the Inquisition and political and religious despotism. In 1580 Portugal was united to Spain, but his foreign policy was highly disastrous, losing a large part of the Netherlands and the Invincible Armada, as the Spanish fleet was called, and consequently the country declined in prestige as a great naval power. Philip III., his son, succeeded him in 1599, in whose reign the Moors were cruelly oppressed and the Moslem faith was extinguished, and in 1609 an edict was issued that all the Moriscos were required to depart from Spain under penalty of death.

The Moors had introduced the cultivation of silk, cotton, tobacco, and rice in Spain and had established systematic irrigation, founded schools, and developed agriculture to a high de-

gree of perfection. They represented the most successful industrial class and their expulsion proved highly disastrous to Spain. From that blow the Iberian peninsula never recovered and Spanish influence suffered still further by the Thirty Years' War. Philip IV. ascended the throne in 1621 and he was succeeded by Charles II., who died without an heir in 1700. This brought on the War of the Spanish Succession, which ended in 1713 by the Treaty of Utrecht, and Philip V., the first of the Bourbon kings, was recognized as sovereign of Spain. By its terms he lost Naples, the island of Sardinia, Sicily, Milan, Gibraltar, Minorca, and the Netherlands. However, he strengthened the kingdom at home. In 1746 Ferdinand VI. ascended the throne, and he was succeeded in 1759 by Charles III. The period of these three kings was one of general prosperity, and in the reign of the last mentioned the Inquisition was broken by banishing the Jesuits in 1767. Charles IV. succeeded to the throne in 1788, but abdicated in favor of Ferdinand VII. in 1808. In the same year Joseph Napoleon was made king by his brother and governed until 1813, when Ferdinand VII. was restored by an army of the European allies under Wellington. It was in this period, in 1800, that Spain ceded Louisiana to France.

While the wars against Napoleon were in progress the Spanish colonies of South America asserted their independence, Florida was sold to the United States in 1819, and a revolution in 1820 abolished the Inquisition and gave the country a more liberal constitution. Ferdinand, having abolished the Salic law in 1822, was succeeded by his daughter as Isabella II. in 1833, under the regency of her mother. Don Carlos, a brother of Ferdinand and a pretender to the throne, raised a revolt, which was suppressed. The queen was declared of age in 1843, but her reign was disturbed by numerous revolts and party intrigues, causing her to flee from the country several times. She was finally exiled and Amadeus, second son of Victor Emmanuel of Italy, was elected king by the Cortes in 1870, but this sovereign resigned after a disturbed reign of three years. Soon after an attempt was made to establish a republic, but this project failed, and Alfonso XII., son of the exiled Isabella, became king in 1874. After his death, in 1885, his wife, Maria Christina of Austria, became queen regent of her infant son, Alfonso XIII. An extended war in the island of Cuba, which had grown highly destructive, finally caused the United States to intervene in behalf of the revolutionists in Cuba, and war between the two nations was formally declared by the United States Congress on April 25, 1898. Every battle on land and sea resulted favorably to the United States. The treaty of peace signed at Paris on Dec. 7, 1898, gave independence to Cuba and ceded Porto Rico and the Philippines to the United States, but a payment of $20,000,000 was made to Spain for the Philippine Islands. Alfonso XIII (q. v.) became of age in 1902, when he assumed full charge of the government. In 1923 the country became involved in a war against Morocco, under General Rivera, which continued until 1926.

SPALDING (spạl'dĭng), **John Lancaster,** archbishop, born at Lebanon, Ky., June 2, 1840. He was educated at Mount Saint Mary's College and at the University of Louvain, Belgium, and in 1863 was ordained priest. In 1869 he became secretary and chancellor of the diocese of Louisville, serving until 1877, when he was appointed to the same position in the diocese of Peoria. President Roosevelt made him a member of the commission to investigate the coal strike of 1902. As a social reformer and leading spirit in educational movements he attained considerable prominence. His writings include "Things of the Mind," "Socialism and Labor," "Education and the Higher Life," "Thoughts and Theories of Life and Education," and "Religion, Agnosticism, and Education." He died Aug. 25, 1916.

SPANDAU (spän'dou), a city of Germany in the Prussian province of Brandenburg, about seven miles west of Berlin. It occupies a favorable site at the confluence of the Havel and Spree rivers, has railroad and electric street railway facilities, and is noted as an industrial center. The manufactures include woolen and linen goods, gunpowder, firearms, and machinery. It is strongly fortified, having a citadel well adapted to prolonged defensive operations, and is an important military depository of Germany. It has a garrison of 3,750 men and the government operates the factories which produce heavy ordnance and gunpowder. The city has long been an important strategic point. It was captured by the Swedes in 1634 and by the French in 1806. Spandau became a territory of the Prussians in 1813 and since then has been greatly improved. Population, 1903, 70,295; in 1920, 84,919.

SPANIEL (spăn'yĕl), an extensive breed of dogs, distinguished by large, drooping ears, an affectionate disposition, and long, silky hair. The three most common species include the *lamb spaniels, water spaniels,* and *toy spaniels.* The color of most spaniels is a livered tint, but white with brown or black markings is not infrequent. The *Maltese, Blenheim,* and *King Charles* dogs are small species of spaniels. Most dogs of the spaniel breed are highly intelligent and very obedient.

SPANISH-AMERICAN WAR, an armed conflict between Spain and the United States, brought about in 1898 through the failure of Spain to provide and maintain a stable government in Cuba. Bloodshed and unrest had disturbed the public affairs of the island for nearly fifty years, and American citizens who had invested in securities and enterprises had no rights that Spain sought to protect. A condi-

tion of war existed in Cuba from 1868 until 1878, known as the *Ten Years' War,* and this was followed by a brief period of peace. The Cubans rebelled in 1895 and sought to establish an independent government, but they were repressed with unusual cruelty and severity, and the conditions of famine and devastation became very severe. Secretary of State Olney, in 1896, represented the interests of American commerce to the authorities in Spain and President Cleveland pointed out that the United States should consider the interests of the Island from the standpoint of higher obligations than those due to Spain. Congress appropriated $50,000 for the relief of the suffering Cubans in 1897.

Early in 1898 the United States dispatched the battleship *Maine* to the harbor of Havana to protect American interests, and many contributions were sent for the Cuban reconcentrados. The battleship *Maine* was destroyed by the explosion of Feb. 15, 1898, and this greatly inflamed the Americans, though it was impossible to place the blame upon officials of Spain. However, Congress appropriated $50,000,000 for national defense and in March an American commission reported that the *Maine* had been destroyed by a submarine mine. Congress made the declaration that "the people of Cuba are and of right ought to be free and independent," and on April 25 issued a declaration of war. While Spain was requested to relinquish Cuba, the President was authorized to accomplish that result by using the army and navy of the United States. On April 23 the President called for 125,000 volunteers and the same day the first gun was fired, when the *Nashville* captured the Spanish merchantman *Buena Ventura.*

Spain had a force of 60,000 men in Cuba and its fleets were at that island and in the Philippines. The United States rapidly mobilized 200,000 volunteer troops, a second call for 75,000 men having been made in May. Camps of instruction were established near Tampa and Chickamauga, and the naval forces were utilized to blockade the ports of Cuba. Commodore George Dewey, on April 30, destroyed the Spanish fleet at Manila Bay, where the Americans lost six wounded, while the Spanish loss was 634 killed and wounded. General Merritt was dispatched to the Philippines with troops to penetrate the islands. In the meantime Admiral Cervera had taken a position in the harbor of Santiago, where his fleet was discovered by Commodore Schley. The latter was superseded by Admiral Sampson on June 1, after which Richmond Pearson Hobson made his daring exploit to sink the collier *Merrimac* with the view of locking the Spanish fleet into the harbor.

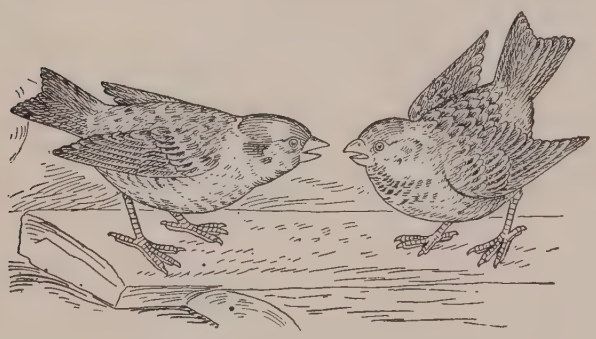
General Shafter sailed from Tampa, Fla., with transports bearing about 17,000 men and officers. With these he attempted to capture the harbor and fleet at Santiago, being aided by about 5,000 Cuban troops under General Garcia. The Spaniards offered resistance at Las Guasimas, where the Americans under General Wheeler lost 68 men. The battle of El Caney was won by the Americans on July 2, in which the Roughriders under Colonel Wood played an important part. Cervera, hoping to gain by the American movements on land, attempted to escape from the harbor of Santiago on the 3d. The Spanish fleet was immediately pursued by every ship in the American squadron, and in the course of a few hours the six Spanish vessels were destroyed or captured. About 350 Spaniards were killed in the battle, Cervera and 1,700 men and officers were captured, while the Americans lost only one man killed and ten wounded. The siege of Santiago continued until July 15, when General Toral surrendered. General Miles, on July 27, landed at Ponce, in Porto Rico, and a few days later took possession of the island in the name of the United States. General Merritt arrived at Manila on the 25th, where he assumed command of 20,000 American troops, and on Aug. 7 captured the city, taking about 11,000 prisoners.

The war was concluded by the Treaty of Paris, negotiated at Paris, France, on Dec. 10, 1898. By its terms Spain surrendered Guam, the Philippines, and Porto Rico to the United States on payment of $20,000,000, but retained certain commercial privileges in the Philippines. At the same time Spain relinquished all claim to Cuba. The expense of the war to the United States is placed at $165,000,000, up to Oct. 31, 1908. Within that period 2,910 Americans lost their lives, but all except 306 died from disease. This successive loss of life caused the suspicion that the camps were mismanaged, but an investigation proved that it was due principally to the climatic conditions of the semitropical countries in which the army and navy operated, the United States' forces being largely unaccustomed to the conditions found there.

SPARKS, Jared, historian and biographer, born in Willington, Conn., May 10, 1789; died in Cambridge, Mass., March 14, 1866. After graduating from Harvard University, in 1816, he became minister of a Unitarian church in Baltimore, and in 1821 was made chaplain of the United States House of Representatives. He was editor of the *North American Review* from 1824 to 1831 and went to Europe within that period to study colonial archives. In 1839 he became professor of history at Harvard University. His writings include "Life of Gouverneur Morris," "Life of John Ledyard," and "Library of American Biography." He edited the "Works of Benjamin Franklin," "Writings of George Washington," and "Diplomatic Correspondence of the American Revolution."

SPARROW (spăr'rō), a genus of birds of the finch family, which are widely distributed in North America and Europe. The American sparrows include several species of small birds,

among them the *song sparrow, chipping sparrow, field sparrow,* and *fox sparrow.* The color is mostly brown with white and black markings, and they are noted for being tame and greedy. The *house sparrow* is native to Europe, but was introduced in Canada and the United States in 1862. Since then these birds have spread over most of North America, owing to the rapidity with which they increase. In some localities a small sum is paid for their destruction, and in several instances legislatures appropriated funds for that purpose. They are noted for feeding with much greed upon caterpillars and other insects, but frequently prove a pest to the market and fruit gardener. In the winter season they congregate in cities and about buildings, both for shelter and food. They nest on the ground and in bushes, usually laying from four to six eggs with spots of dark brown.



HOUSE SPARROW.

SPARROW HAWK, the common name of several small falcons. They are about twelve inches long with an alar extent of twenty inches. The wings are short and they have a curved bill and long, slender legs. The plumage is of a brownish color, usually diversified by darker spots, and the male has dark brown shades on the upper side of the head. Both sexes incubate. These birds are bold and skillful in attacking their prey, which consists of sparrows, pigeons, lizards, mice, young chickens, and insects. The *American sparrow hawk* is a handsome bird and is allied to the kestrel. Several species of sparrow hawks are native to Europe and Australia.

SPARTA (spär'tȧ), or **Lacedaemon,** a city of ancient Greece, the next in power to Athens. Anciently it was the capital of Laconia. It occupied a fine site on the Eurotas River, about twenty miles from the Mediterranean, and was the chief city in the Peloponnesus. Mount Taygetus is situated at the rear of its site, rising to a height of 7,985 feet, and other elevations make the valley and slopes occupied by the city a strategic point of easy defense. The laws of Lycurgus prescribed the architecture that should be erected, thus preventing the construction of buildings with elaborate architectural forms, and they brought about such a military spirit that the city rose to great power in the 6th century B. C. It is reputed that Lacedaemon, son of Zeus, founded the Spartan state, and Menelaus is famed as its most eminent king.

Sparta joined Athens and other cities of Greece in the war against the Persians and Leonidas, King of Sparta, commanded the Grecian forces at the celebrated pass of Thermopylae. Later a spirit of rivalry rose between the two great cities, which caused the Peloponnesian War in 431 B. C., a contest continuing 29 years. The war terminating favorably to Sparta, it became the predominating influence in Greece, and under King Agesilaus waged an extended war against Persia. During that period Athens revived in power. From 378 to 363 B. C. the celebrated Theban War took place, when the Thebans conquered Sparta, and the city never again rose to its former greatness. Cleomenes made an unsuccessful attempt to restore its former power in 235, but at that time many foreigners had settled in the city, while the small per cent. of remaining Spartans had been reduced to a state of poverty. The Romans finally conquered Sparta and other Grecian cities in 146 B. C.

The laws of Lycurgus are supposed to date from 825 B. C., and their influence upon Spartan life and industries was very marked. The development of the mind was sacrificed to that of the body. Physical strength and military skill were the qualities most desired in the citizens, the sole object being to train soldiers for the defense of the state. This system gave rise to ignorance, but inculcated habits of courage and sobriety. Athens taught the arts of fine speaking, while Sparta inculcated brave acting and laid the foundation for skillful captains and wise magistrates and legislators. Three classes of society existed in most of the period that Sparta flourished. The governing class was made up of the *Spartiatai,* the free middle class was constituted of the *Perioikoi,* and the slaves were the *Helots.* Those who were unable to pay their debts, and the captives of war, were reduced to the Helot condition, while the skillful in physical exercises and military accomplishments gained promotion to the governing class. Children of weak or defective constitution at birth were not allowed to live, while all the strong and vigorous became the charge of the state.

Sparta maintained extensive colonial, commercial, and manufacturing enterprises, and made remarkable development in the culture of cereals, fruits, and domestic animals. The Helots were bound to the soil, which they cultivated for its owners, but in cases of emergency they served in the army. Education of a high literary class was not deemed conducive to the public good as in Athens, and there was a marked difference between the instruction given males and females. The modern town of Sparta occupies the site

of ancient Sparta. It was founded by the Greeks in 1836 and is the capital of the province of Laconia. Population, 4,375.

SPARTACUS (spär'tȧ-kŭs), eminent Roman gladiator, born in Thrace in the latter part of the 2d century B. C. He adopted the occupation of his father, who was a shepherd, but he was taken captive by the Romans and became a trainer of gladiators at Capua. In this gladiatorial school were a large number of Gauls, Thracians, and Germans, who had been taken captive and enslaved, and these formed a conspiracy to undertake an insurrection against the Roman government. After escaping captivity they enlisted many slaves and a large number of peasants, thus forming an army of 75,000 men under command of Spartacus. He succeeded in conquering several cities of southern Italy and defeated two Roman armies with considerable loss to the latter. However, after he and his followers gained their liberty, Spartacus desired that his soldiers should return to their homes, but they preferred to march against the Roman capital and were met by an army under Licinius Crassus. A decisive battle occurred near the source of the Silarus River, in which the insurrectionists were defeated. Spartacus was slain in the contest. This uprising is known as the *Servile War* and occurred in the period included between 73 and 71 B. C.

SPARTANBURG, a city in South Carolina, county seat of Spartanburg County, in the northwestern part of the State, on the Southern and the Atlantic Coast Line railroads. The surrounding country produces fruits, tobacco, and cereals and has deposits of iron, gold, and limestone. It is a cotton-manufacturing center, and produces clothing, earthenware, and machinery. Among the noteworthy buildings are the county courthouse, the Kennedy Public Library, and the State Institute for the Deaf, Dumb and Blind. It is the seat of Wofford College, a Methodist Episcopal institution founded in 1854. Brick and macadam pavements, waterworks, sewerage, and street railways are among the improvements. Population, 1900, 11,395; in 1920, 22,638.

SPAVIN (spăv'ĭn), the name of a disease of the horse, consisting of certain swellings upon the hock joint, which is situated in the hind leg between the knee and the fetlock. It may occur in two forms, known as bog spavin and bone spavin. *Bog spavin* is due to an injury of the true hock joint of the horse, accompanied by swelling and inflammation, and usually is brought on by a sprain or overwork. *Bone spavin* is caused by an injury and is accompanied by a bony deposit about the joint, causing a local enlargement and stiffness. In bone spavin it is necessary to give the animal rest and in most cases the lameness passes away, though the joint continues to be stiff.

SPAWN (spạn), the eggs of mollusks, fishes, crustaceans, frogs, and other species of animals. The eggs or ova are extruded in a mass by the females and, after being fertilized by the male, give rise to new life in the same species. This applies only to some forms of oviparous animals, while in others the fertilization by the male is effected before the eggs are extruded. In ovoviviparous animals copulation takes place between the sexes and the eggs are hatched in the body, as in some reptiles and fishes. The eggs deposited in the spawn, as in the fishes, often reach several millions. Spawn is generally deposited near the shore, or an ascent is made of the streams to deposit the spawn in fresh water, as is done by the salmon.

SPEAKER (spēk'ẽr), the presiding officer of a deliberative assembly, whose duty is to preserve order and see to it that the rules of debate are enforced. The presiding officer of the British House of Lords is the lord chancellor, whose appointment is derived from the sovereign, but the House of Commons elects its own speaker, subject to the approval of the crown. The latter can only speak or vote in committee, except in the case of an equality of votes, when he gives the deciding vote. He holds office until the dissolution of the Parliament of which he was elected speaker. Since the office is nonpolitical, the speaker may hold during opposing and successive administrations, and is usually rewarded with a peerage on retiring.

In the United States the speakership of the House of Representatives is a political office and the speaker owes his election to the majority party. He has the right to appoint the standing committees and is the acknowledged leader of his party in the house. Since he is the chairman of the Committee on Rules, he exercises a wide influence over the course of legislation, and his power to recognize any one who may desire to speak is absolute. He has the right to vote on any measure, signs all bills and resolutions, and practically decides what shall be considered and how long the debates shall continue. By a majority of the house he may be removed from office.

SPEAKING TRUMPET, a metallic tube with a small end fitted to the mouth and considerably enlarged or widened at the other extremity. It is used for giving greater intensity to the voice, as the sound is forcibly projected through it. The *megaphone,* an inexpensive kind of speaking trumpet, is used extensively at public gatherings, such as horse races. Instruments of this class were used by the ancient Greeks, and it is reported that Alexander the Great used one in giving orders. The modern speaking trumpet was invented by Sir Samuel Morland (1625-1695) and has been variously modified and improved. The larger sizes are from three to five feet in length and make it possible to understand the human voice several miles. This is due to the fact that the sound is intensified by successive reflections from the walls of the tube, and that the aërial undulations which produce it are thus carried forward

in a collected body on the line of the axes of the trumpet.

SPEARMINT (spēr'mĭnt). See **Mint.**

SPECIE PAYMENT (spē'shĭ), **Resumption of,** the term used in American history in reference to the resumption of coin payments after the Civil War. At the beginning of the conflict, in 1861, the banks of New York City were required, owing to the disturbed conditions of business, to suspend payment in coin, and in this course they were followed by most of the banks throughout the country. Congress came to the relief by authorizing the issue of large quantities of United States notes, making them a legal tender for all purposes, except payment of interest on the national debt and duties on imports. This caused the paper money, known as *greenbacks,* to depreciate in value, and had the effect of bringing about uncertainty in financial and commercial affairs. In 1866 Congress passed an act to retire the greenbacks by the payment of specie, at which time the amount in circulation was $356,000,000, but this did not have the desired effect. The matter of resuming specie payment was taken up in earnest in 1875, when Congress ordered that government contracts, including paper currency, should be payable in specie on and after Jan. 1, 1879. Gold and silver bullion was accumulated in the treasury through the sale of bonds and the mints were run over business hours for some time. The resumption of specie payment caused an increase in the value of currency, hence prices decreased correspondingly, and those in debt suffered losses and hardships in that they were compelled to make payments in money whose value was increasing rapidly.

SPECIES (spē'shēz), the term used to denote a single group of animals or plants, which are subordinate to a genus and are capable of reproducing similar organisms by interbreeding. In the kingdom of organic nature the species are founded on identity of form and structure, both external and internal. The species have capability of producing beings like themselves, and the offspring likewise possesses the power of reproduction. The term species is applied in mineralogy and chemistry in inorganic substances having identity of composition, physical properties, and crystallization.

SPECIFIC GRAVITY (spê-sĭf'ĭk grăv'ĭ-tỹ), or **Relative Weight,** the ratio of the weight of a substance to that of the same volume of another substance taken as a standard of comparison. Since temperature and other agencies have an influence upon the weight of a given bulk of matter, it is necessary to know the temperature in all exact measurements of standards. Pure distilled water at a temperature of 62° Fahr. is taken as the standard for measuring the specific gravity of liquids and solids, which is reckoned unity, and air is the standard for designating the specific gravity of gases. A pint of mercury weighs 13.6 times as much as a pint of water; thus, if we compare the weights of equal bulks of mercury and water, we find that the mercury is 13.6 times as heavy as water. Hence, the specific gravity of mercury is 13.6.

According to Archimedes' law, a body in water is buoyed up by a force equal to the weight of the water it displaces. To obtain the specific gravity of any substance heavier than water, a given bulk is weighed in pure distilled water, then in air, and the specific gravity is found by dividing the weight in air by the loss of weight in water. The specific gravity of solids lighter than water, such as a piece of cork, is found by attaching a given bulk to a piece of metal heavy enough to sink the cork in the water. The weight of cork in air being known, it is divided by the weight it loses in water (which is found by ascertaining the loss of weight to both the copper and cork; then finding the weight lost by the copper when immersed; then the difference in this weight and the weight they both lose in water; the result is the weight that the cork loses in water), and the quotient equals the specific gravity.

Specific gravity may vary slightly in different specimens of the same substance, but in the table below is given the specific gravity usually assigned to the common substances named:

Platinum	21.53	Sulphur	2.00
Gold	19.30	Limestone	2.75
Granite	2.75	Milk	1.03
Copper	8.90	Ice	.92
Zinc	7.15	Potassium	.96
Iron	7 78	Quicklime	.80
Silver	10.47	Pine Wood	.66
Mercury	13.60	Cork	.24
Cast Iron	7.21	Ocean Water	1.03
Iridium	21.80	Sulphuric Acid	1.84
Glass	2.90	Alcohol	.79
Honey	1.45	Ether	.71
Diamond	3.50	Bone	1.75
Chalk	2.65	Liquefied Oxygen	1.12
Cobalt	8.95	Human Body, alive	.89

SPECIFIC HEAT, the amount of heat required to raise the temperature of a given quantity of that substance, one or more degrees, as compared with the amount of heat required to raise an equal quantity of some other substance through the same number of degrees. Since water possesses the highest specific heat of any common substance, it is generally taken as the standard of comparison. However, the specific heat of a substance varies with its condition. A given substance has a greater specific heat in the gaseous than in the liquid state, and its specific heat is reduced by converting it from the liquid to the solid state. As compared with water taken as a standard at 32° Fahr., if the specific heat is 1, the specific heats of an equal weight of wrought iron is 0.114; alcohol, 0.659; vinegar, 0.920; mercury, 0.033.

SPECTACLE (spĕk'tà-k'l), an instrument for aiding or shielding the eyes. It consists of a pair of lenses, which are framed, usually with metal, so as to keep them in their proper position. The lenses are made of a fine quality of glass and are ground to accommodate the need of the wearer. As eyesight becomes weakened

in old age, it is frequently necessary to change the glasses, which is also the case with those wearing spectacles to shield the eyes from light too strong for them to bear. *Long sight,* or *far-sightedness,* is remedied by wearing convex glasses, which converge the rays of light on the retina of the eyes. *Short sight,* or *near-sightedness,* on the other hand, requires concave lenses, which diverge the rays of light to cause the image to be formed on the retina. *Astigmatic sight* is a defect of the eyes in which the focus of the crystalline lens varies in different azimuths, and can be remedied by spectacles in which the focus differs in different azimuths. In most cases of defective eyes it is advisable to consult an optician, that glasses may be practically adjusted. Spectacles of wire gauze are worn to exclude dust particles. That class of devices is commonly called *goggles.* Most spectacles have numbers engraved on their glasses to indicate their focal length in inches. It is best to have the spectacles close to the eye, and so adjusted that they make the distance of distinct vision about twelve inches.

SPECTROSCOPE (spĕk'trō-skōp), an optical instrument used to separate rays of light into their prismatic colors, so as to determine the substance, which may be done from the position from the spectral lines. This instrument enables us to examine the spectra of solar light, as well as those produced by flames in which different substances are volatilized. See **Spectrum.**

SPECTRUM (spĕk'trŭm), the colored image or images produced when the rays from any source of light are decomposed or dispersed by refraction through a prism. The law of refraction of light was discovered by Willebrord Snell (1591-1626), a Dutch mathematician, in 1621, and by its aid Descartes explained the rainbow. Later Newton investigated the decomposition of light, after an examination of the spectrum of sunlight, which he carried on by means of intercepting with a prism the light coming into a dark room through a hole. The most common form of spectrum used in study is produced by the light of the sun passing through a triangular glass prism and falling on a screen. Ordinarily sunlight produces the sensation of white light on the eye, but when it falls on a glass prism the component colors are unequally refracted or bent out of their course in passing through the glass, and become spread out into a band displaying the seven rainbow colors. The violet is at one end of the series and the red is at the other, the order being violet, indigo, blue, green, yellow, orange, and red. The order may be remembered by the word *vibgyor,* formed by the initial letters, though there are a large number of different shades where the component colors overlap each other. Any luminous body gives off a spectrum, which is characterized by the particular ingredients of which it is composed.

In order to determine the composition of a substance, it is necessary to reduce it to a gas or vapor and heat the gas or vapor until it emits light, when the light may be examined. The unaided eye is unable to detect all the differences in the light given off by the different gases of glowing vapors, unless the various colors of such light are separated from one another in its passage through a prism. An instrument called the *spectroscope,* or *spectrometer,* is used for that purpose. This instrument consists of four essential parts: the part designed to volatilize the substance to be examined and heat its vapor to luminosity; a tube with a plate containing a narrow slot at one end, so as to limit the amount of light thrown on a convex lens at the other; a prism, or a number of prisms, through which the light passes for the formation of the spectrum; and a microscope with which to examine the spectrum so formed. The examination of a spectrum is called *spectrum analysis.* The light of the sun and of many stars has been examined by spectrum analysis, and these heavenly bodies have been shown to contain some of the same elements as those which exist in the crust of the earth. Spectrum analysis has been employed successfully in physiology and pathology and for the discovery of metals, such as iridium and rubidium.

SPECULUM (spĕk'ū-lŭm), an alloy of tin and copper, usually in the proportion of 58 parts of tin to 126 parts of copper. It is employed in preparing the reflecting surfaces in several kinds of telescopes. Glass is now frequently used for the same purpose, being prepared by spreading a covering of silver film over the side turned toward the object. In surgery, a speculum is an instrument for dilating canals and cavities in the human body, as in the ear, thus facilitating an examination of their interior. A reflecting body is an essential part of these instruments, since it serves to facilitate an examination of the parts by throwing upon them a strong light.

SPEECH, the vocal sounds uttered to communicate ideas, produced by a modification of the vibrations generated in the larynx. These modifications take place as the vibrations pass outward through the cavities of the mouth and nose. Speech appears to be controlled by the nerve centers that are seated on the left side of the brain, in the back part of the third frontal convolution. While speech is natural, its exercise depends upon careful training. Articulate speech is stopped by pressure or injury to this part of the brain, but it does not necessarily prevent vocalization, nor does it prevent the expression of thought by signs or by writing. See **Voice.**

SPEEDWELL (spēd'wĕl), a genus of herbs and shrubs native to the temperate regions of both hemispheres. They include about 200 annual and perennial plants. Many species produce beautiful flowers, generally colored blue,

pink, or white. The *common speedwell,* having bitter and astringent leaves, is used to some extent in medicine and as a substitute for tea. *Brooklime,* a common wild plant of Europe and North America, belongs to this genus. It has ovate or oblong leaves and bluish flowers.

SPEKE (spēk), **John Hanning,** eminent explorer, born in Bideford, England, May 24, 1827; died Sept. 15, 1864. He attended the Barnstable grammar school and in 1844 embarked for India, where he served in the Bengal infantry during the Punjab War. While in the service he collected numerous natural history specimens, which he placed at the disposal of the Royal Geographical Society of London, and in 1857 was engaged by that association to explore the great lakes and interior of tropical Africa. After discovering Lake Tanganyika, he proceeded northward and discovered the southern region of Victoria Nyanza, but soon after returned to England. He made a second tour in Africa in 1860, accompanied by Captain Grant, and in that year discovered that the Nile is the outlet of the great African lakes. The published accounts of his travels were verified by Stanley in 1876. Speke returned to England in 1863 and the following year was accidentally shot while attending a shooting match near Bath. He published accounts of his discoveries in two works entitled "What Led to the Discovery of the Source of the Nile" and "Journal of the Discovery of the Source of the Nile."

SPELLING REFORM, the movement to simplify the spelling of certain words in the English language. A board to promote this movement was organized under the chairmanship of Brander Matthews, in New York City, in 1906, funds for the purpose having been supplied by Andrew Carnegie. The first list of 300 words to be simplified was published in March of the same year. President Roosevelt recommended that the departments of the government use this simplified spelling and later presented the matter to Congress, but that body did not adopt the proposed simplification. However, the National Educational Association approved the 300 words in a meeting held in 1907, although the board of directors of this organization restored three words that the association had simplified ten years before.

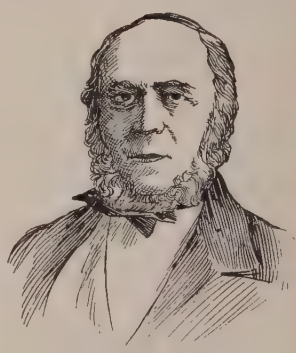
The movement was reorganized on a very satisfactory basis in 1908. At present the Simplified Spelling Board consists of about 43 members and several representatives of English-speaking countries aside from the United States. The board is assisted by 165 scholars and educators who are engaged in university and public school work. The recommendations formulated by means of this movement were approved by 300 periodicals, 2,000 business houses, 3,000 institutions of higher learning, and 18,000 educators. Among the simplifications are to use *e* instead of *ae* in *aesthetic, er* instead of *re* in *meter,* and *f* instead of *ugh* in *draught.* The following are examples of words spelled according to the system recommended:

abridgment	curst	paragraf
affixt	cyclopedia	pedagog
altho	decalog	quartet
anesthetic	demagog	silvan
antitoxin	dettor	subpena
blest	ecumenical	thorofare
catalog	envelop	thruout
cifer	esophagus	winkt
claspt	favor	woful
comprest	gelatin	yoman
coquet	mama	

SPELTER. See **Zinc.**

SPENCER (spĕn'sĕr), a town in Worcester County, Massachusetts, ten miles west of Worcester, on the Boston and Maine Railroad. It has the Richard Sugden Library, several fine schools, and Spencer Public Park. The manufactures include tools, brick, shoes, underwear, wire, woolen goods, machinery, utensils, and clothing. It has good municipal facilities, such as waterworks, electric and gas lighting, electric street railways, and pavements. Spencer was settled in 1720, was made a part of Leicester in 1744, and became incorporated in 1753. Population, 1905, 7,121; in 1925, 6,523.

SPENCER, Herbert, founder of the system of synthetic philosophy, born in Derby, England, April 27, 1820; died Dec. 8, 1903. His father was a teacher of mathematics in Derby, under whose direction he received careful training at home, and was early instilled with interest in natural sciences and entomology. He had delicate health and did not secure the advantages of a university education, but in 1837 entered the office of a railway engineer, and for eight years pursued civil engineering. Within that time he contributed a number of articles to the *Civil Engineers' and Architects' Journal* and to the *Nonconformist.* He removed to London in 1848, where he became engaged on the editorial staff of the *Economist,* and contributed to the *Westminster Review.* In 1850 he published his first work of importance under the title of "Social Statics," in which the ethical and social growth of mankind is outlined largely on the theory of evolution.



HERBERT SPENCER.

Spencer announced the prospectus of his *synthetic philosophy* in 1860, which he proposed to give to the world in eleven complete volumes after working twenty years, but the last volume did not appear until 33 years later. This great work is comprised of five divisions, which he

classed in the following manner: the proper scope and limits of Philosophy, Biology, Psychology, Sociology, and Morals.

The writings of Spencer were appreciated much earlier in America than in England, and his visit to the United States, in 1882, was the occasion of a most enthusiastic reception. Many of his books have been translated into practically all the leading languages, and his theories have had a very wide influence from the standpoint of social, philosophical, scientific, and moral thought. He devoted his time zealously to his self-imposed task, refusing all academic honors and memberships in famous domestic and foreign societies. Among the most important of his writings not named above are "Principles of Biology," "Principles of Psychology," "Principles of Sociology," "Descriptive Sociology," "Political Institutions," "Ethics of Social Life," "Positive Beneficence," "Education," "Classification of the Sciences," "Spontaneous Generation," "Coming Slavery, or Man Versus the State," and "Factors of Organic Evolution."

SPENCER, Samuel, capitalist, born in Columbus, Ga., March 2, 1847; died Nov. 29, 1906. He graduated at the University of Georgia, in 1867, and subsequently studied at the University of Virginia. At an early age he engaged in railroading and through efficient services was rapidly promoted to fill responsible positions. In 1857 he was made president of the Baltimore and Ohio Railroad, which he rehabilitated to a large extent, and soon after invested as a stockholder in many lines of the South and the Southwest. For several years he was president of the Southern Railway, which he succeeded in placing upon a successful business basis. His death resulted from an accident while riding in his private car on an inspection tour of the Southern Railway.

SPENCER GULF, an extensive inlet on the southern shore of Australia, in the State of South Australia. It extends from the Indian Ocean toward the northeast a distance of 200 miles and is from three to 90 miles wide. Cape Spencer and the Yorke Peninsula are east of it, and Cape Catastrophe and the Eyre Peninsula lie immediately west. At its entrance are Thistle and Gambier islands. Port Augusta is at the head of the gulf.

SPENSER, Edmund, eminent poet, born in London, England, in 1553; died at Westminster, Jan. 13, 1599. Little is known regarding his parents and early training, but it is generally assumed that he lived in humble circumstances during his youth. He entered Cambridge University after taking a secondary course, graduated from that institution in 1573, and received the degree of master of arts three years later. Soon after he settled in the north of England, where he published his "Shepherd's Calender" in 1579, which he dedicated to Sir Philip Sidney. The latter was his constant and beneficent friend, and through his influence Spenser was sent to Ireland as secretary to Lord Grey of Wilton. Soon after he received a grant of about 3,000 acres of land in Cork County, which had been taken as a forfeiture from the Earl of Desmond, and he accordingly selected Kilcolman as his residence. While there he wrote the "Faërie Queen," which he published in 1590. This is his greatest literary product. It is rich in brilliant poetical expression of the sentiments of chivalry. It was dedicated to Queen Elizabeth and brought him a small pension. In 1594 he married Elizabeth Boyle, a relative of the Earl of Cork. The sonnets he wrote during the courtship, a total of 88, were combined to form his "Epithalamium."

Rebellion broke out in the southern part of Ireland in 1598, and, since the English had shown little mercy in the island, they could expect little in return. Spenser's castle was attacked and burned, and his infant child perished in the flames. The poet was overwhelmed by his misfortune and grief and hastened to London, where he died soon after. The remains were buried in Westminster Abbey, near the tomb of Chaucer. Spenser was a man of refinement and his poetry is uniformly and exquisitely musical. It is characterized by a singular richness and sweetness of rhythm. Several of his writings are still read with an abiding interest. Among the works from his pen not already named are "The Poet's Year," "Mother Hubbard's Tale," "Colin Clout's Come Home Again," "Tears of the Muses," and a work in prose entitled "View of the State of Ireland."

SPERMACETI (spĕr-mȧ-sē'tĭ), a white fatty substance found in the sperm oil of the head of the sperm whale and several other animals. It is in the fluid state while the animal is alive, but separates after death and forms concrete deposits differing from the sperm oil, the latter being a neutral liquid at ordinary temperatures. Spermaceti is inodorous and nearly tasteless. It has a white appearance, resembling wax, and is used largely for making candles. In pharmacy it serves as the basis of ointments and cerates. The sperm whale is a large species of the whale family native to the Pacific Ocean, often weighing 175 to 215 tons, and the male attains a length of 60 to 80 feet. A large-sized sperm whale yields 10 to 25 barrels of spermaceti and 60 to 100 barrels of oil.

SPERM WHALE. See **Whale.**

SPEY (spā), a river of Scotland, rising in Inverness-shire, and, after a course of 110 miles, discharging into Moray Firth. It has important fisheries, chiefly salmon. The Spey is the second longest river of Scotland, being exceeded in length only by the Tweed.

SPEZIA (spĕt'sĕ-ä), a seaport city of Italy, on the Gulf of Spezia, fifty miles southeast of Genoa. It is situated on the coastal railroad, has an excellent harbor, and is noted as the most important naval station of Italy. The

arsenal is the finest of the kingdom Extensive manufactures of cannon, gunpowder, sailing vessels, and clothing for the army and navy are maintained by the government at Spezia. The city is provided with modern facilities and has a large trade in cereals, wines, olive oil, and fruits. Population, 1922, 66,482.

SPHENE (sfēn), the name of a mineral belonging to the titanite variety, so called from the wedge shape of the crystals. In color it varies greatly, but yellow, green, and dark brown predominate. It is found in a crystallized form with gneiss, granite, and mica slate.

SPHERE (sfēr), in geometry, a body bounded by a surface, every point of which is equally distant from the center. The figure may be generated by the revolution of a semicircle about its diameter, which is called the *axis of the sphere.* A line drawn from the surface to the center is called the *radius.* The surface is equal to four times the area of a circle of the same diameter; and its solid contents is equal to that of a pyramid whose base is equal to the surface of a sphere, and whose altitude is the radius. Spheres are to one another as the cubes of their diameters. See **Globe.**

SPHEROID (sfē'roid), a body resembling a sphere in form, but differing from it in not being perfectly spherical. It may be generated by a revolution of an ellipse about one of its axes. If this be the conjugate axis, the spheroid is termed *oblate;* if the transverse axis, it is said to be *prolate* or *oblong.*

SPHEROIDAL STATE, the form assumed by a liquid when thrown on a surface of highly heated metal. This may be illustrated by placing a small quantity of water upon a highly heated metal surface, when it rolls about in spheroidal balls or masses. The temperature of the drops is a few degrees below the boiling point, owing to the fact that they are not in actual contact with the heated surface, but float on a cushion of nonconducting vapor. Any liquid in the spheroidal state evaporates rapidly by the heat radiated from the surface.

SPHINX (sfĭnks), an ancient Egyptian divinity, who personified wisdom and the fertility of nature. This goddess was transplanted to Greece, where it became possessed with malignant power and partook of the nature of a monster. When Hera became displeased with the Thebans, she sent this monster as a punishment for their offenses. Sphinx had her seat on a rocky eminence near the city of Thebes, which commanded a pass that the Thebans were compelled to traverse in their way of business, and propounded a riddle to all comers. She tore all persons to pieces if they failed to solve it. King Creon became grieved at the number of people that fell prey to the monster and, on consulting the oracle of Delphi, was informed that Sphinx could be destroyed by solving one of her riddles. Oedipus, being offered the crown and Jocaste in marriage by the king, proceeded to the spot where Sphinx was seated. The riddle propounded was, "What creature goes in the morning on four legs, at noon on two, and in the evening on three?" Oedipus promptly replied, "Man: since in his infancy he creeps on all fours, in his prime walks on two legs, and when old age has enfeebled his powers, he brings a staff to his assistance, and thus has three legs." The solution being correct, Sphinx flung herself over the precipice and perished in the abyss below. Sphinx was represented in Egypt with the body of a lion and the head of a woman, but the Grecians sculptured sphinxes with the bust and head of a male.

The *Great Sphinx of Egypt* is a representation of the goddess Sphinx. It is hewn from solid rock, with feet built of masonry. The body of the sphinx is 172 feet long and rises about 66 feet above the surface. The head is 30 feet long and the legs of masonry are 50

SPHINX AND PYRAMIDS AT GIZEH.

feet, stretching forward almost parallel to its sides. This structure, being near the pyramids of Gizeh, is thought to have been built about the same time. Other sphinxes occur in different parts of Egypt, some having the heads of rams or hawks, but none approaches the Great Sphinx in size. Originally the Great Sphinx had a beard, and a cap covered its head, but now only traces of these remain, and the countenance is mutilated so that the outlines of the features can scarcely be traced. It is supposed to be the work of Chephren, a king of the fourth dynasty.

SPHYGMOGRAPH (sfĭg'mŏ-grăf), an instrument used to measure and record the flow of the blood in an artery. It is placed over the pulse, or some part of the body where the pulse beat is distinct, and by this means a series of delicate levers are set in motion, recording the results of the measurement on a

moving surface of paper. This instrument not only records the frequency of the pulse beat, but gives a record of the shape and force of the blood wave. The sphygmograph, when combined with a microphone, constitutes a *sphygmophone,* an instrument for determining by the ear the rhythm of the pulse of a person at a distance.

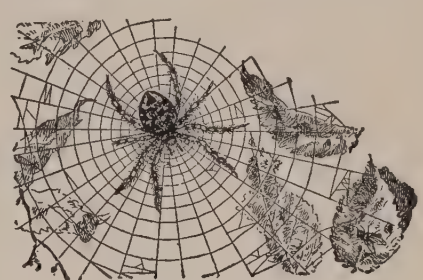
SPICE ISLANDS. See **Moluccas.**

SPICES, a class of aromatic and pungent vegetable substances, used extensively for flavoring food and as condiments. The production of spices is an important industry in many tropical countries, especially in the warmer regions of Asia and the East Indies, but large interests are vested in the growth and preparation of these commodities in the West Indies and tropical America. Spices were brought from Arabia and other countries of the East to Europe in the Middle Ages, and Arabia is still a noted spice-producing and trading country. The aromatic and pungent properties of spices are due chiefly to essential oils, but different parts of various plants produce spices of value. Cloves are derived from the bud, cinnamon from the bark, pepper and nutmeg from the fruit, and ginger from the root. The clove tree is native to the Molucca Islands, from the flower bud of which the *cloves* of commerce are obtained. These trees attain a very old age, often yielding products for 75 to 200 years, and their branches grow to a height of forty feet. Cloves produce the essential oil of cloves, while the blossom of the clove tree yields the spice, which is gathered and dried before quite in full bloom.

The cinnamon tree is native to Ceylon, but it has been naturalized in Southern Asia and tropical America. *Cinnamon* is obtained from the inner bark, which is taken from the tree in strips about four feet long and tied into packets or bundles. The bark ferments slightly within a short time, thus causing the inner bark to become separated, which is dried and put in small crates for the market. Many species of pepper have been described, but the common grades of black and white pepper of the market are secured from a climbing shrub, and the berries, about the size of a small pea, grow in pods containing about fifteen to thirty each. Their color, when ripe, is yellowish and, when dried, they turn to a dull black. The *black pepper* usually sold in the market is obtained by crushing or grinding the whole berry, but the outer covering is removed to obtain the *white pepper. Cayenne pepper* is native to South America, but is grown at present in different sections of the Temperate zones as a condiment and for medical use. The nutmeg tree is cultivated in various parts of Asia, Africa, and tropical America, and yields both the *nutmeg* and *mace.* The fibers surrounding the nut are the mace, which has a reddish color when fresh, and afterward assumes a light brown tinge under exposure to the sun. The kernel or seed within the mace is the nutmeg, which, when shelled, is dried and is then ready for the market. Nutmegs are valued highly in cooking for their aromatic flavor and odor, and both the nutmeg and the mace yield a highly useful oil by compression.

Ginger is prepared from the rootstalk of a tropical plant native to the West and East Indies. It is used in cookery and medicine. White ginger, produced largely in Jamaica, is prepared by scraping off the outer covering of the roots. It is regarded superior to the black or East India ginger, in which the covering is not removed. *Mustard* is the seed of the mustard plant. It is crushed and adapted for use as a condiment and for medical purposes. Several species are cultivated, as the white and black mustard native to Asia and Africa. The wild mustard is a very prolific plant in many sections of Canada and the United States, and the seed is sometimes employed as a condiment by mixing with the seed of cultivated species and not infrequently for medical use, especially as a poultice. *Vanilla* is the product of a climbing orchid, the fruit being known as the vanilla bean. It supplies the vanilla of commerce and yields a delicate aromatic odor used in flavoring syrups, ice cream, and confectionery. The plant is native to Florida and to many sections of Asia and the Pacific islands.

SPIDER (spī'dĕr), an extensive division of animals, which includes the scorpions and mites. Although they are often classed with the in-



SPIDER AND WEB.

sects, they constitute the class of animals known as *Arachnida.* The spiders differ from most insects in that the body consists of only two segments instead of three, the head and chest being united to form one segment. Spiders have no wings and are supplied with eight legs, instead of six, as in insects, and they likewise differ from the latter in having no antennae or feelers. They breathe by means of well-developed pulmonary or lung sacs, and do not pass through several changes in life, like some insects, but their shape at birth is the same as in the adults. The organs of sight are not highly developed, although they have six or eight eyes, but they possess a keen sense of touch.

In the abdomen of spiders are four to six

conical processes, seated in a fleshy formation, and these are perforated by a large number of small tubes or orifices. From these tubes are drawn very fine but wonderfully strong threads, and with them many species weave artistically complicated webs. The webs serve a number of useful purposes, but are intended chiefly to entangle the heedless insects on which they prey. Some species construct webs as a place of abode and as a means to pass easily from place to place. They seldom leave a locality without spinning a thread. This thread they utilize as a means of descending from any height as well as to again elevate themselves, which they do by taking up the thread, but it is not used a second time. Spiders have been observed to hang suspended by a long thread with the view of being driven by the wind against some object at a short distance, in this way securing passage across a considerable space, even across a narrow stream.

Caterpillars spin their threads from the head, but spiders do so from the back part of the body. They descend with their head foremost and ascend forward, using their comblike claws to guide and manage the thread. The webs are variously constructed in different species, and they differ in strength and workmanship quite as much as do the nests of birds. The threads are gummy when first issuing from the tubes, thus facilitating their attachment to different objects and to each other, and when the web is finished the spider lies in wait for the heedless insects that may happen to rush into the snare. As soon as the insect is entangled, the spider rushes upon it, inflicts a severe wound, and fetters the prisoner with a winding silken thread. The wound is inflicted with the hooked mandibles, from which a poisonous fluid passes into the opening, whose effect is to almost instantly kill the prey. Flies are the favorite food of the spiders, but they feed with greed on various other insects. The poison is secreted by a gland near the upper joint of the mandible, and some species, as the tarantula in the southwestern part of the United States, inflict wounds that are dangerous even to man.

The spiders include many interesting species. They are found in all countries, but attain their greatest number and largest size in the tropical regions. Most species spin a silken cocoon in which to deposit their eggs. They are remarkable for being attentive to their young. The number of eggs varies greatly, ranging frequently from 50 to 2,000, but many of the young hatched from them die before reaching maturity. Female spiders spin five to seven webs in a season, but the males are seldom seen at this kind of work. They are inclined to hide during the day much more closely than the females, and at night come out to pass from web to web. Among the different classes are the *sedentary* or *common house spiders*. They are widely distributed, and are subdivided according to the manner of constructing their webs. The *hunting spiders* weave silken tubes for an abode, and rush out to seize their prey, on which they leap with great greed. A class known as *water spiders* makes their homes among the stems and leaves of aquatic plants, constructing their webs under water, and their eggs are attached to leaves or stems of plants below the surface, but surrounding them is a watertight structure containing atmospheric air brought down by the adult spider. The most curious nests are built by the trapdoor spiders. They are constructed in a burrow under the ground, and admission to it is by a lid or door attached by a kind of silken hinge. Some species native to South America are about the size of a man's thumb, and are able to seize and kill little birds. Spiders are preyed on by toads, wasps, and different species of birds. See **Gossamer.**

SPIDER'S FOOT, MAGNIFIED.

SPIKENARD (spīk'närd), or **Nard,** an aromatic plant. The roots are three to twelve inches long and send up little spikes bearing purple flowers. The ancients gathered the roots for preparing valuable perfumes to be used at feasts and in baths, and they still have a wide use for that purpose and in medicine. Christ was anointed with the ointment of spikenard while in the house of Simon in Bethany. The plant is native to India and China, and is found in the Himalayas to elevations reaching 15,000 feet. The name is applied to an American plant of the ginseng family, somewhat resembling the wild sarsaparilla.

SPINACH (spĭn'ăj), or **Spinage,** a genus of herbaceous plants of the goosefoot family, extensively cultivated in gardens to be used as greens. This product is eaten as a salad, or is boiled in various ways, usually with butter. The leaves grow on long footstalks and are best when quite young. Spinach is most juicy and best flavored when the growth is luxuriant. It becomes bitter at the appearance of a long stem, which bears spike-formed flowers. Several species are cultivated, among them the prickly, smooth, and Australian spinach.

SPINAL COLUMN (spī'nal kŏl'ŭm), or **Spine,** the backbone of vertebrate animals, which is made up of a series of bones called the *vertebrae.* Each vertebra consists of a solid part, of an open ring, and of three major projections or processes. The human spine has 24 movable vertebrae, seven of which are known as *cervical;* twelve, as *dorsal;* and five, as *lumbar.* At the base of the spine are five false vertebrae, which unite in the adult to form the sacrum, and below them are four small bones that unite in the adult to form the coccyx. The vertebrae

comprise a succession of rings of bone, within which is a cavity called the *spinal canal,* which extends from the base of the skull to the lower end of the vertebral column. Within the spinal canal is the spinal cord, with its membranes and vessels.

SPINAL CORD, the cordlike structure situated in the spinal column of vertebrate mammals, constituting a part of the central nervous system. The spinal cord in man has an expansion just as it starts from the brain, called the *medulla oblongata.* It is from fifteen to twenty inches in length. The function is to transmit outgoing and incoming nerve impulses, and it is the seat of the centers of reflex action. It is securely lodged within the long cavity of the vertebrae and is protected by a double membrane called the *arachnoid,* within which is the cerebro-spinal fluid. A fine tissue, known as the *pia mater,* is within the arachnoid, and surrounding the whole is a tough membrane called the *dura mater.*

The spinal cord differs from the brain in that the white matter is on the outside and the gray matter is within. From the spinal cord spring 31 pairs of spinal nerves. Of this number one pair issues from the *coccyx* and five pairs proceed from the *sacral region.* Five pairs are known as *lumbar* and twelve pairs as *dorsal nerves.* Eight pairs in the region of the neck are called the *cranial,* or *cervical nerves.* Each nerve arises by two roots; the anterior is the motory and the posterior is a sensory one. When the anterior root is cut, the power of motion is lost and, when the posterior is cut, that of feeling is destroyed. Spinal congestion, meningitis, paralysis, and hemorrhage are among the diseases of the spinal cord.

SPINDLE (spĭn'd'l), the slender rod or pin in a spinning wheel, by which the thread is twisted, after the fiber has been drawn from the distaff. It is usually long and slender, and in most cases is made of metal, though formerly it was exclusively of wood. The name spindle is also applied to the pin on which the bobbin is held in the shuttle of a loom, or in a spinning wheel.

SPINDLE TREE, or **Staff Tree,** the name of a genus of shrubs and small trees, of which about 300 species have been described. The *common spindle* tree is native to Europe, where it is planted for ornamentation in parks and on lawns. The wood is white, has a fine grain, and was formerly used in making spindles and musical instruments. Crayons are made from the charcoal of this tree. A species known as *burning bush,* so called from its bright red fruit, is native to North America. It is a low shrub, and grows chiefly in moist woods. A woody climber, known as the *climbing bittersweet,* is one of the species.

SPINNER (spĭn'nĕr), **Francis Elias,** statesman and financier, born in Mohawk, N. Y., Jan. 21, 1802; died in Jacksonville, Fla., Dec. 31, 1890. He was the son of John Peter Spinner (1768-1848), who came from Germany to the United States in 1801. The son was carefully educated and, in 1824, engaged in the confectionery business at Herkimer, N. Y. He was made auditor of the port of New York in 1845 and from 1855 to 1861 served as a Democrat in the United States Congress. In the latter year he was appointed treasurer of the United States, and served in that capacity until 1875. His long service in the treasury caused his peculiar signature, which he cultivated in order to prevent counterfeiting, to become known in all parts of the world, and at the close of his official career the accounts of the office did not show the discrepancy of a penny. He retired from service in 1875, and lived in Jacksonville, Fla., until his death.

SPINNING, the art of combining animal or vegetable fibers so as to form continuous yarn or thread. The methods of spinning differ somewhat, according to the fibers used, which may consist of cotton, flax, jute, silk, or wool. Spinning is an industry that has come down to us from ancient times, and the methods formerly practiced in Egypt are still in vogue in many countries, but they have been replaced largely by modern machinery. The ancients employed the spindle and the distaff, and all the spinning they did was by hand. A quantity of the prepared material was loosely wound upon the distaff, held in the left hand, and the thread was attached to the spindle, which consisted of a tapering piece of wood. The spinster produced a rotary motion of the spindle by a twirl of the hand, and at the same time drew out between the thumb and forefinger of the right hand a supply of the fibers until the motion of the spindle was exhausted. The spindle was drawn in as soon as the movement stopped, when the thread was wound or attached in the same manner, and the process was repeated.

A spinning wheel was invented at Nuremburg, Germany, in 1530, but it was used only for flax spinning. Later it was improved to spin other materials, and may be said to have suggested the spinning jenny invented by James Hargreaves in 1764. The advantage of the spinning jenny was that it employed a number of spindles, while the spinning wheel had only one. However, modern machinery has replaced it, and now many machines of different construction are in extensive use. The spinning machines employed at present are constructed so as to turn out a particular yarn, which permits of greater simplicity than where regulating devices are employed for adjusting so as to finish products of different grades.

SPINNING JENNY, the name of the earliest machine for spinning more than one thread at a time. It was invented by James Hargreaves, in 1764, and soon displaced the spinning frame constructed by Arkwright about the same time. The spinning jenny had a wheel or

cylinder to be turned with the right hand, while the left was used to draw out the rovings of the material to be spun, which were twisted as the wheel turned. A piece of wood worked by the toe caused a wire to be let down, and by this means the threads were pressed out and wound upon bobbins. At first the jenny had eight spindles, but later the number was increased from time to time, until as many as 120 were worked on one machine. Samuel Crompton, in 1779, invented the machine that combined the principles of both the frame and the jenny. His invention, known as the *mule jenny,* superseded all others, and was the first to employ the general principles now employed in all classes of spinning.

SPINNING WHEEL, a machine for spinning fibers into thread. It is an improvement on the ancient spindle and distaff in that the work is done through the agency of a wheel and treadle. This invention, though simple and inexpensive, cannot be traced back farther than 1850. It consists of a frame, in which the spindle is made to revolve by mechanical action, either by the hand or the foot, though the latter is used most extensively. In this machine the spinster guides the wool or other fiber with the hand, and the spindle revolves rapidly through the impulse imparted by a band from the treadle to the wheel. By carefully drawing the thread by means of the hands, it is possible to regulate the degree of fineness as well as its uniformity.

SPINOLA (spē'nō-lȧ), **Ambrosio, Marquis of,** distinguished soldier, born in Genoa, Italy, in 1569; died in Piedmont, Sept. 25, 1630. He descended from a wealthy and noble Italian family, and became distinguished as a military leader of the Spanish forces in the Netherlands, of which he was made chief commander in 1603. The following year he reduced Ostend, which had been besieged unsuccessfully for two years by Archduke Albert of Austria, thus attaining to great renown. Prince Maurice of Orange was his famous opponent, against whom he fought with indecisive results until 1609, when an armistice was concluded. He was sent with a Spanish army into the Palatinate of the Rhine in 1620, where he won a number of important victories, and the following year again invaded the Netherlands. His principal exploits were the capture of Jülich in 1622 and that of Breda in 1625, reducing the latter after a ten months' siege. Subsequently he had command of the Spanish troops in Italy, his death occurring while the siege of Casale in Piedmont was in progress.

SPINOZA (spĭ-nō'zȧ), **Baruch,** best known as Benedict Spinoza, eminent philosopher and author, born in Amsterdam, Holland, Nov. 24, 1632; died Feb. 21, 1677. He was of Jewish parentage, but had the benefit of diligent instruction both in the Bible and the Talmud. His feeble constitution in early life induced him to pursue the course of a student instead of engaging in commercial enterprises, and a study of sciences and the writings of Descartes caused him to turn from the rigid belief and practices of the Jews. Saul Levi Morteira, his teacher in Hebrew, was so impressed with his genius as a student that he based the fondest hopes on his future career, but when Spinoza became interested in Latin and philosophic research instead of synagogue practices he was threatened with severe punishment by his teacher. In 1656 he withdrew finally from the Jewish faith and was excommunicated, and, being persecuted by several Jewish fanatics, he left Amsterdam for Rynsburg, and ultimately settled at The Hague, in 1671.

BARUCH SPINOZA.

Spinoza had learned the trade of grinding optical lenses, at which he supported himself for some time, but gave devoted attention to sciences and philosophic study. He was offered a professorship at the University of Heidelberg by the elector of the Palatinate, Charles Lewis, with the condition that he should have full liberty of teaching except that he should say nothing against the established religion, but this he declined because of his desire to exercise perfect freedom of thought. Louis XIV. of France made him the offer of a pension, which he likewise refused. Simon de Vries offered to bestow a large sum of money upon him, but he declined to accept more than a moderate sum, sufficient for his support. Thus provided with a small annuity, he gave the later part of his life wholly to scientific research.

The philosophy of Spinoza is based on that of Descartes, and his writings have been widely translated. The first work to appear was his "Ethics," which he published in 1665, concealing both the name of the writer and place of publication. On account of its strong plea for liberty of speech and philosophy, this writing was condemned on the Index of the Catholic authorities and by the States-General of Holland. A translation into the Dutch did not appear until 1693, but it was widely read in the German, and such German writers as Schleiermacher, Goethe, Fichte, Hegel, and Schelling later commended it as a basic work in philosophy. Other writings of Spinoza include "Treatise on Theological Politics," "Abridgment of the Meditation of Descartes," and "Opera Posthuma," the last named appearing in the year of his death. Many treatises on the writings of Spinoza have been

published. At The Hague is a monument to his honor.

SPIRITUALISM (spĭr'ĭt-ŭ-ạl-ĭz'm), the term used by philosophical writers to denote the opposite of materialism. When employed in this sense, the term embraces the doctrine that there are spiritual substances, or beings, as distinguished from material, and which are not cognizable by the senses and not revealable through any of the properties of matter. In a specific sense the term is applied to the belief that the spirits of the dead in various ways communicate and manifest their presence to man chiefly through persons called *mediums.*

The belief that departed spirits have power to communicate with the living has been held for many centuries. However, modern spiritualism dates from 1848, when John D. Fox and his wife claimed to have been disturbed by strange sounds and rappings at the door and different parts of the house. They resided in Hydeville, N. Y., and long attributed the disturbances to natural causes, but at length assumed that the rappings were brought about by reason of spirits of departed persons desiring to communicate with them. Fox and his daughters afterward became mediums and gave seances in many cities of the United States. Spirit circles were organized soon after, and many adherents rapidly joined in the view that it is entirely natural for departed spirits to communicate with the living when the proper conditions are complied with by those in life. A company of mediums visited Europe in 1852, where they attracted considerable attention, and in 1855 D. D. Home made an impressive tour of the European continent. He impressed Napoleon III. very strongly by various manifestations, and made converts among leading scientists and jurists. The manifestations from the spirit world take place at seances, and are in the form of handwritings, rappings, and impressions upon the mind of the medium. In many cases actual frauds have been perpetrated, but manifestations have taken place that have led a large number of people to believe in the existence and activity of the soul apart from the body.

In 1893 the National Spiritualists' Association was formed in America. The number of spiritualists in the United States and Canada is estimated at 1,700,000. They support ninety auditoriums, have property valued at $1,750,000, and include 10,650 professional mediums. The eighth annual convention was held in 1900. A large number of magazines and other periodicals are devoted to the spread of the doctrine of spiritualism. Much literature has been published on the subject. Spiritualism has developed with equal rapidity in Great Britain, France, and other European countries. Besides those actively affiliating with the spiritualists, there are many who belong to other organizations, but support some of their tenets. A good instance of this class may be cited in the case of Swedenborg, who alleged open daily communication with the spirit world, and claimed that he had frequent intercourse with spirits and angels.

SPIROMETER (spī-rŏm'ē-tĕr), an instrument for measuring the capacity of the lungs, especially the volume of air which may be expelled after the deepest possible inspiration. Several devices of this kind are in use. The most common form consists of a vessel with a float set in the top, which it fits closely, and the air is blown through a tube below, causing the float to rise. An index or graduated scale indicates the rise in inches, hence it is possible to determine the number of cubic inches of air exhaled.

SPITHEAD (spĭt'hĕd), an anchorage or roadstead off Portsmouth, England, situated in the channel which separates the Isle of Wight from the mainland. It is so named from the Spit, a sand bank, which extends a distance of three miles along the south shore of England. The roadstead is about four miles wide and fourteen miles long, and is a favorite anchorage for the navy of Great Britain. It is strongly fortified, and is known as the *King's bedchamber,* owing to its security.

SPITZ, the name of a small breed of dogs, employed chiefly as a pet. It is about the size of the spaniel, has a pointed face, and is usually white or whitish in color. This class of dogs is sometimes called *Pomeranian,* owing to its being grown extensively in Pomerania, Germany. It is not serviceable for any kind of work, but some strains are quite beautiful.

SPITZBERGEN (spĭts-bĕrg'ẹn), an island group in the Arctic Ocean. It consists of three large and several small islands. The area is about 30,000 square miles. Spitzbergen, Barents, and Northeast Land are the chief islands. The group is situated 350 miles east of Greenland and about the same distance north of Norway. The climate is extremely cold, and in the two summer months the thermometer rarely rises more than 35° above zero, though in this short season fully 100 species of plants spring up and ripen their seeds. About 50 of these plants have been described, of which the most vigorous are not over four inches in height. The coast lines are generally icebound on the eastern side, while the western coast is more or less affected by the Gulf Stream. Little is known of the interior, but it is certain that the snow line is only a short distance above the sea level on the interior mountains, which rise to heights of about 4,000 feet. The sun is below the horizon for four months in the winter, from Oct. 22 to Feb. 22, and the longest days are four months. Among the animals native to these islands are several species of bears, foxes, and reindeer. Numerous sea fowls are abundant in the fall season. No permanent settlements exist, but many explorers for northern specimens and

hunters from Norway and Russia frequent the islands, the latter finding considerable profit in pursuing the walrus. The islands were first discovered by Hugh Willoughby, a British navigator, in 1553. They were explored to some extent by the Dutch in 1696. Russia claims the islands as a dependency.

SPLEEN (splēn), or **Milt,** an organ found only in vertebrate animals. It is situated between the cardiac end of the stomach and the diaphragm. In man the spleen varies more in size and weight than any other organ, though its usual length is about five inches, and its weight three to six ounces. It is a vascular or ductless gland, and the surface is covered with the peritoneum. The color is dusky red. It increases in size after a meal, and in about five hours returns to its normal form. Its functions are believed to be connected with digestion, but its exact purpose is not known. The spleen has been removed from man without causing harmful results.

SPLÜGEN (splü'gẹn), a pass in the Alps of Europe, leading from the canton of Grisons, in Switzerland, to Lombardy, in Italy. The highest point in the pass has an elevation of 6,946 feet above the sea. In 1834 the government of Austria built three galleries to protect the road from avalanches.

SPOFFORD (spŏf'fẽrd), **Ainsworth Rand,** public librarian, born in Gilmanton, N. H., Sept. 12, 1825; died Aug. 11, 1908. He received a classical education by private instruction. After establishing a book-selling establishment in Cincinnati, he became an editorial writer on the Cincinnati *Daily Commercial,* in 1859, and in 1861 was made assistant librarian of Congress. He was appointed chief librarian in 1865, and as such published annually for many years *The American Almanac.* The library contained about 70,000 volumes when he was put in charge, but within a period of 35 years it was enlarged to over 750,000 volumes, and many manuscripts and pamphlets were added. He published "Library of Choice Literature," "Practical Manual of Parliamentary Law," "Library of Historic Characters and Noted Events," and "Library of Wit and Humor."

SPOFFORD, Harriet Elizabeth, authoress, born in Calais, Me., April 3, 1835. She was the daughter of Joseph N. Prescott, and graduated from the Pinkerton Academy, Derry, N. H. In 1865 she married Richard S. Spofford, a cousin of A. R. Spofford. After contributing to the *Atlantic Monthly* and several other periodicals, she published "Sir Rohan's Ghost," in 1859. Many of her writings have been widely read, and their subjects are usually indicated by the titles. They include "Ballads About Authors," "New England Legends," "Scarlet Poppy," "Art Decoration Applied to Furniture," and "The Servant Girl Question." She died Aug. 15, 1921.

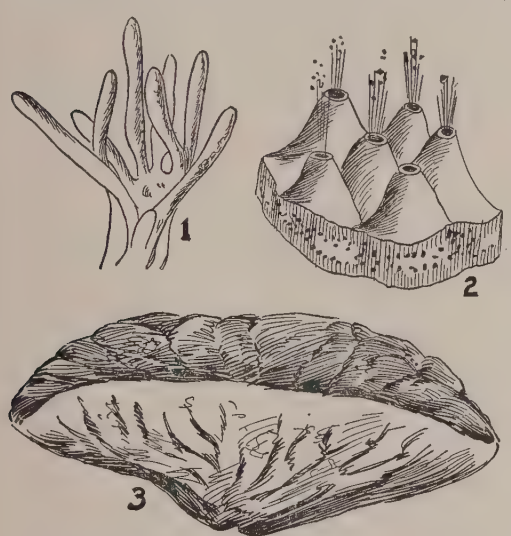
SPOKANE (spō-kăn'), a city of Washington, county seat of Spokane County, 450 miles east of Seattle. It is situated on the Spokane River and the Great Northern, the Northern Pacific, the Union Pacific, the Canadian Pacific, the Burlington, and other railways. About 25 square miles are included in the tract lying within the city limits, of which the surface is greatly diversified. In the northern part, lying along and north of the river, the surface is gently rolling, but toward the south it includes a hilly and bluffy tract. The river flows in a deep gorge, and has a descent of 142 feet by a series of falls, affording immense water power for manufacturing purposes. Many substantial bridges span the river within the city limits, including those designed for railway, wagon, and street railway traffic.

The finest residential section is in the southern part, occupying the summits of a beautiful range of hills, which overlook the city and an extensive region of the surrounding country. As a whole the architecture is modern and substantial, and the streets are finely paved with stone, vitrified brick, and asphalt. Among the larger buildings are the county courthouse, the city hall, the post office, the auditorium, the *Review* building, the Masonic Temple, the Carnegie public library, and the Spokane and Athletic Club buildings. The ecclesiastical edifices include an Episcopal cathedral and a Roman Catholic cathedral, and several fine structures maintained by the Methodist, Presbyterian, Baptist, and other denominations. It is the seat of Gongaza University, the Saint Stephen's School for Boys, the Academy of the Holy Name, the Whitworth College, and many hospitals and charitable institutions. The city has fine ward and high school buildings, all of which carry approved and well-articulated courses.

Spokane is surrounded by a fertile farming and pine-lumbering country. It is important as a wholesaling and a jobbing center and has a large trade in merchandise, live stock, fruits, and manufactures. Lumber products, machinery, flour, furniture, marble and granite products, pottery, brick and terra cotta, clothing and canned foods are among the leading manufactures. It has extensive systems of waterworks, sewerage, and gas and electric lighting. Intercommunication is provided by a system of electric railways, which has branches to Lake Coeur d'Alene, about thirty miles east, and other adjacent points.

The region was not settled until 1873, when the village was called Spokane Falls. In 1881 the Northern Pacific Railway was completed to the city, which, together with the extensive facilities for water power, caused it to grow rapidly. A fire destroyed a large portion of the buildings in 1889, but it was rebuilt rapidly and soon surpassed its former development in wealth and population. In the five years from 1900 until 1905 it more than doubled in the number of inhabitants. Population, 1905, 73,852; in 1920, 104,437.

SPONGE (spŭnj), an animal of the group *Porifera,* having pores in the body wall and being without tentacles. Many species of sponges have been described by naturalists, differing widely in form and structure. Their close resemblance to vegetable forms caused them long to be regarded members of the vegetable kingdom, but their animal nature is evident from internal structure, and from the delicate skin surrounding the body. They are mostly marine. The largest forms are common to the tropical seas, and they gradually decrease in size toward the colder zones. They grow both in deep and shallow water and are fixed in mud or to rocks at the bottom. The body is composed of an internal skeleton, or framework, and a gelatinous substance called *flesh.* In the skeleton are many pores which open into much-branched canals passing into ciliated chambers, and during life the jelly flesh envelops all internal parts. This fleshy substance resembles a peculiarly formed protoplasm,



SPONGES.

1, Branching Sponge; 2, Living Bath Sponge; 3, Bath Sponge.

which, when taken out of the water, has a liver color and becomes sticky. These animals feed upon the minute organisms found in the water, which constantly circulates through the pores, circulation being maintained by cell action. New individuals are produced by internal and external budding, and by spermatozoa. Among the species best known are the *sheeps-wool,* the *yellow,* the *velvet,* the *glove,* the *bath,* and the *grass* sponges.

The skeletons of sponges are the sponges of the market. They are secured by diving. The diver is provided with diving apparatus and loosens the growing sponges by means of an instrument. However, in water less than fifty feet deep the sponges may be secured from a boat at the surface. One man manages the boat, while another, called the *hooker,* watches the bottom through a glass-bottomed basket, which is held in one hand, while with the other hand he manipulates a long pole to which is attached a three-pronged hook. When a sponge is found, it is detached from the bottom with the hook and is drawn to the surface. The fresh sponges are killed by more or less prolonged exposure to the air and the fleshy matter is separated from the skeleton by burial in the sand for several days, after which a process of soaking and washing follows. The skeleton becomes a useful commodity for the market and is sold extensively for various purposes.

Among the uses of sponges are those connected with the toilet and bath, washing paint work, stuffing mattresses, and filtering. Valuable sponge fisheries occur in the West Indies, off the coast of Florida, and in the Mediterranean. Those off Florida yield products valued at about $600,000 annually, representing about 400,000 pounds of dry sponges. The finest sponges come from Smyrna. Those used for washing carriages and horses are obtained chiefly in the Bahamas. The sheepwool is the best grade of sponges and excels in value all others combined. It is sold at wholesale at about $2.75 per pound, while the grass sponge, a coarse and cheap grade, is sold by fishermen at about 35 cents per pound. Sponge culture has been successfully introduced in several tropical regions. Fossil sponges occur in various strata of limestone, being evidence that this group of animals lived before the oldest Silurian epoch.

SPONTANEOUS COMBUSTION (spŏn-tā′nē-ŭs kŏm-bŭs′chŭn), a term applied to the ignition of mineral and other substances without the application of fire. This phenomenon is frequently the explanation of the origin of fires in machine shops and buildings. Phosphorus in a dry state is liable to ignite spontaneously in a temperature as low as 70°, this being an explanation why ignition often occurs where a large number of lucifer matches are kept in a bulk. Charcoal in a dry state does not undergo spontaneous combustion, but when oils are added it becomes heated and takes fire, while coals associated with pyrites ignite easily in a wet condition. Many instances are on record in which fire generated from placing large quantities of hay in a moist condition into a mow, ignition in such cases resulting from fermentation accompanied by considerable heat. In like manner fire may be caused by the fermentation of rags, tow, cotton, straw, flax, and other vegetable matter. The self-ignition of cotton waste used in cleaning machinery has been of quite frequent occurrence, especially where the cotton product was mixed largely with oily substances. Several writers cite cases of spontaneous combustion in the human body, which they allege occurred as a

result of indulging excessively in the use of alcohol. The body being saturated with alcohol, combustion is thought to have taken place spontaneously, but Liebig and other writers assert that such combustion is impossible, and assign the phenomenon as due to bringing a candle or other flame in close contact with the body. It has been observed that combustion in the human body, where it takes place at all, is limited to aged persons and to the very lean or very fat who indulge excessively in the use of alcoholic beverages.

SPONTANEOUS GENERATION, or **Abiogenesis,** the term applied to the theory that living forms may originate without the intervention of living matter. The question whether under certain conditions living matter is produced by nonliving matter was debated from ancient times until the 17th century, when scientists undertook to disprove it through the use of the microscope, demonstrating the existence of bacteria and other minute organisms that could not be detected with the naked eye. However, interest was stimulated through the theory of infectious diseases and the correlation of forces, and naturalists have been led to bestow more attention upon it than at any previous period.

SPOONBILL, a genus of wading birds of the heron family, having a resemblance to the stork and the ibis. They are so called from

WHITE SPOONBILL.

the large size of the bill, which is flattened and widened at the tip. These birds are widely distributed, usually frequenting the mouths of rivers and the seashore, but the species are not numerous. The *roseate spoonbill* is native to the United States and is found in many sections of the warmer and tropical parts of America, especially in Florida and the Carolinas. The color is almost pure white on the neck, with a rosy tinge on the body, which is about thirty inches long, and the bill attains a length of eight inches. It has an alar extent of fifty inches. This class is usually seen in flocks feeding in wet and marshy places, where these birds catch worms, insects, fish, and small crustaceans. The *white spoonbill* is native to Europe, moving northward in the spring and to the regions of the Mediterranean on the approach of fall. The color of the body is almost a pure white, but there is a tinge of yellow on the breast, while the bill and legs are black. A kind of sturgeon quite common in the Mississippi and several of its tributaries is known by the name *spoonbill.* The same name is sometimes given to the *shoveler duck.*

SPOONER, John Coit, public man, born in Lawrenceburg, Ind., Jan. 6, 1843; died June 11, 1919. He removed to Wisconsin, where he attended public schools, and in 1864 graduated at the university of that State. He served efficiently in the Civil War, at first as a private and subsequently as a captain, and at the close of the war was brevetted major. He was admitted to the bar in 1867 and the following year became assistant State's attorney-general. From 1872 to 1874 he was a member of the State Legislature and in 1885 was elected a Senator of the United States. George W. Peck defeated him for Governor of Wisconsin in 1892, and the following year he began a successful law practice in Madison. He was elected to the United States Senate to succeed Senator Vilas in 1897 and was reëlected in 1903. In State politics he was opposed by Governor La Follette. As a Senator he exercised a wide influence and served on a number of important committees. In 1909 he was succeeded in the Senate by Benjamin F. Shively (born in 1857).

SPOTSWOOD, Alexander, soldier and colonial Governor, born at Tangier, Africa, in 1676; died June 7, 1740. He entered the British army and served with the Duke of Marlborough at Blenheim, where he was wounded. In 1710 he went to Virginia as Lieutenant Governor and was active in promoting William and Mary College. He was removed from office in 1722, but later served as Deputy Postmaster-General. He took an active part in promoting the cultivation of tobacco and favored making tobacco notes a medium of exchange. In 1740 he was sent to the West Indies as a major-general. His death occurred at Annapolis, Md.

SPOTTSYLVANIA COURTHOUSE (spŏt-sĭl-vā'nĭ-ȧ), a village in Virginia, about 55 miles west of north of Richmond. It was the scene of a noted battle of the Civil War. This engagement is classed as one of the battles of the Wilderness, which extended from May 5 to June 1, 1864. The Battle of Spottsylvania Courthouse commenced on May 10, 1864, when the Union army under General Grant made

an attack on the Confederates under General Lee, who were intrenched behind their earthworks. The Union army was repulsed with great loss. It was on this occasion that Grant sent his famous message, "I propose to fight it out on this line if it takes all summer," to the Secretary of War. He repeated the assault on the 12th and compelled Lee to withdraw to his inner line of intrenchments, while Grant moved around his left on his way to Richmond, which afterward resulted in the Battle of Cold Harbor.

SPRAGUE (sprāg), **William Buell,** clergyman and writer, born in Andover, Conn., Oct. 16, 1795; died in Flushing, Long Island, May 7, 1876. After graduating from Yale University, in 1815, he took a course in the Princeton Theological Seminary, and in 1819 became a minister of the Congregational Church. Besides holding a number of important charges, he was pastor at Albany, N. Y., for forty years and subsequently held a pastorate at Flushing. He published a large number of sermons and essays and wrote many biographies and theological treatises. Among his writings are "Life of Timothy Dwight," "Letters from Europe," "Women of the Bible," "Annals of the American Pulpit," and "Lectures on Revivals."

SPRAIN, or **Strain,** a violent stretching or wrenching of tendons or ligaments of a joint, with or without the rupture of their fibers or the displacement of the bones. Sometimes sprains are as serious and lasting as dislocations, especially if care is not exercised in the use of the part before the swelling and inflammation have fully subsided. Sprains of the back are the most serious, while those of the knee or ankle are quite common and painful. Splints should be worn where the tissues are badly fractured, and cold or hot lotions on the parts are recommended.

SPRAT, or **Garvie,** the name of a small fish of the herring family, found in large numbers in the Atlantic waters of Europe. It is about six inches long and is frequently canned and sold as a sardine. Sprats are taken in large numbers and are eaten fresh, or may be spiced, dried, or canned. The true sprat is not found in America, but several small fishes common to the southern part of the United States are known by that name.

SPREE (sprā), a river in Germany, which rises in the eastern part of Saxony, near the boundary of Bohemia, and, after a course of 215 miles toward the northwest, enters the Elbe through the Havel River at Spandau. The valley contains rich pasture and agricultural lands and is well wooded. The Spree is navigable for 100 miles. It is connected with the Oder by the Frederick Wilhelm Canal. Among the important cities on its banks are Berlin, Bautzen, Lüben, Spermberg, and Beeskow.

SPRING, a flow of water from the interior of the earth, caused principally by the water resulting from rain or snow. When rain falls on a porous soil it is rapidly absorbed, and a spring results by the water running along an inclined layer of clay or hard rock until it emerges at some lower level. Springs are caused in some localities by water being forced upward from the reservoirs into which it has collected, principally by the pressure of compressed gas, highly heated steam, or a communicating column of water. In hilly and mountainous regions springs result largely by the water soaking into the porous upper soil

INTERMITTENT SPRING.

and continuing downward until it is intercepted by an impervious stratum, along which it runs until the layer crops out on the hill or mountain slopes. Springs in the region of plains are formed principally by the action of gases or the pressure of other bodies of water.

Springs are commonly divided into variable and intermittent. *Variable springs* are influenced by the amount of rainfall, varying at different seasons, but they do not cease flowing at any period of the year, while *intermittent springs* flow only a short time after wet weather, drying on the appearance of the dry season. *Artesian,* or *flowing,* wells result when a hole is bored into the earth's crust to form an opening for the escape of water from a reservoir situated on a higher elevation. *Hot,* or *thermal, springs* are due to water flowing over a portion of the earth's crust that is highly heated, and *geysers* result from volcanic action or the pressure of interior gases. *Mineral springs* occur where the water soaks through or flows over mineral deposits, such as lime, silicon, sulphates, salt, carbonate of iron, and carbonic acid gas.

SPRING, the season of the year that follows winter and precedes summer, so called because it is the time when plants begin to grow in the temperate and colder zones. It begins with the vernal equinox, on March 21, and ends with the summer solstice, on June 21. In North America the spring months are March, April,

and May, while in the Southern Hemisphere, they are September, October, and November. The months of February, March, and April are the springtime of Great Britain.

SPRINGBOK (sprĭng'bŏk), a species of antelope, which resembles the gazelles in size and habits. It is native to the open plains of South Africa. This animal is so named from its habit of springing upward when alarmed, or at play, and its flesh is highly prized as a food. It possesses much beauty, having a pure white beneath and markings of white on the head and down the back, while the body is brown. It is larger than the roebuck, and its horns are curved in the form of a lyre. The limbs are long and delicate, and it is able to run with great swiftness. Large numbers congregate in herds as they feed on the plains and hillsides. The springbok may be taken young and tamed, but its largest size and greatest beauty are developed in the native state. The skin is much esteemed for shoes.

SPRINGER, William McKendree, public man, born at New Lebanon, Ind., in 1836; died in 1903. He graduated at the Indiana State University, in 1858, and the following year was admitted to the bar. In 1872 he was elected to the State Legislature of Illinois and was a member of Congress for twenty years, from 1875 until 1895. During this time he rose to prominence as a leader in the Democratic party. President Cleveland appointed him, in 1895, chief justice of the United States court of appeals of Indian Territory.

SPRINGFIELD (sprĭng'fēld), the capital of Illinois, county seat of Sangamon County, 185 miles southwest of Chicago. It is situated on the Illinois Central, the Baltimore and Ohio Southwestern, the Wabash, the Chicago and Alton, and other railroads and is surrounded by a productive farming and coal-mining country. The streets are wide and well paved with brick, asphalt, and macadam. It has intercommunication by an extensive system of electric street railways. Within the heart of the city is the State capitol, which is a fine structure of stone 399 feet long and is crowned by a dome 364 feet high. About a mile from the heart of the city is the monument and mausoleum of Lincoln, in Oak Ridge Cemetery, which contains the remains of the President, his wife, and two children. The old capitol, now the county courthouse, and the residence of Lincoln, are historical buildings. It is the seat of the Lutheran Concordia College, the Bettie Stuart Female Institute, the Saint Agatha's School, and the Academy of Our Lady of the Sacred Heart. Other noteworthy buildings include the post office, the city hall, the public library, the high school, the executive mansion, the Odd Fellows' Building, and a number of fine hotels and hospitals. The city library has 65,500 volumes and there are about 92,500 volumes in the State library.

Springfield is the seat of an extensive trade in farm produce, merchandise, and coal. It has important car shops, woolen mills, and boiler and engine works. The general manufactures include brick and tile, soap, flour, clothing, and machinery. The large works of the Illinois Watch Company are located here. It is the seat of the State fair and the Illinois State Museum of Natural History. The streets are well lighted with gas and electricity and adequate systems of waterworks and sewerage are maintained. In 1819 the first settlement was made in its vicinity, but it was not incorporated as a town until 1832. The State capital was located here in 1837 and it was chartered as a city in 1840. Population, 1920, 59,183.

SPRINGFIELD, a city of Massachusetts, county seat of Hampden County, 95 miles southwest of Boston, on the Connecticut River and the Boston and Maine, the Boston and Albany, and other railroads. The river is spanned by several bridges. Intercommunication is by an extensive system of electric railways, from which branches extend to many points in the State. In the public park system are 1,340 acres, but Forest Park, the most important public grounds, includes 750 acres. It is the seat of a United States arsenal, founded in 1795, which is the largest in the country. Many fine memorials decorate the squares and public grounds. These include Saint Gaudens' "The Puritan," the Soldiers' and Sailors' Monument in Court Square, and the statues of Miles Morgan and President McKinley.

The architecture is largely of brick and stone. Among the principal buildings are the county courthouse, the Trinity Methodist church, the Saint Michael's cathedral, and the Congregational and Unity churches. Other structures include the city hall, the post office, the high schools, the American International College, the Union railway station, and the Mercy, Shriners, Wesson and Springfield hospitals. The public library contains 1,422,777 volumes. and several fine collections of books are maintained by the private institutions and the public schools.

Springfield has a growing foreign trade and is important as a wholesaling and jobbing center. Large investments are represented by its industries, including about 800 establishments. It has extensive machine shops, paper and flouring mills, tobacco and cigar factories, railway shops, and manufactures of automobiles, rubber goods, cotton and woolen textiles, and machinery. Systems of gas and electric lighting, waterworks, and sanitary sewerage are maintained. The streets are well paved with asphalt, cement, and macadam. Springfield has the largest United States railway post office in the New England states. The first settlements in the vicinity of Springfield were made in 1635, when the village was called Agawam. It was burned in 1675 as a result of King Philip's War. Riots

occurred during Shay's Rebellion, in 1786. The city was chartered in 1852. Population, 1905, 73,484; in 1925, 142,065.

SPRINGFIELD, a city in Missouri, county seat of Greene County, situated among the Ozark Mountains, 220 miles southwest of Saint Louis. It is on surfaced highways and on the Missouri Pacific and the Saint Louis and San Francisco railroads and is surrounded by a region yielding large quantities of lead, zinc, and other minerals. Live stock, cereals, fruits, and grasses are grown in the vicinity. Among the noteworthy buildings are the Drury College, the Loretto Academy, the Saint John's Hospital, the high school, the county courthouse, and a United States government building valued at $150,000. The city is improved by rapid transit, pavements, waterworks, a sewerage system, and several fine parks. Among the manufactures are machinery, flour, cotton and woolen goods, chemicals, lumber products, engines, and farming implements. It has a growing trade in farm produce and merchandise. Springfield was incorporated in 1838. Population, 1900, 23,267; in 1920, 39,620.

SPRINGFIELD, a city in Ohio, county seat of Clark County, on the Mad River, 80 miles northeast of Cincinnati and 45 miles west of Columbus. It is on surfaced highways and the Erie, the Pennsylvania, the Detroit, Toledo and Ironton, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. The utilities include gas and electric lighting, public waterworks, sanitary sewerage, and electric street railroads. Among the manufactures are furnaces, boilers, engines, hardware, windmills, farming implements, flour, incubators, linseed oil, sewing machines, iron fencing, and earthenware. The important buildings include the city hall, the Federal government building, the public library, the county courthouse, and numerous fine public schools and churches. It is the seat of Wittenberg Lutheran College, a coeducational institution founded in 1845. Other features include the Y. M. C. A. building, the Snyder Park, the Soldiers' Monument, and the Fern Cliff Cemetery. Springfield is important as a market for merchandise, fruits, and cereals. It was platted in 1801 and incorporated as a city in 1850. Population, 1920, 60,840.

SPRINGHILL, a city of Nova Scotia, in Cumberland County, on the Cumberland Railway and Coal Company's line and the Intercolonial Railway. It is situated near the Maccan River, twenty miles southeast of Amherst, and is surrounded by a productive coal-mining country. The manufactures include leather, packed meat, woolen goods, and machinery. It has a number of fine schools and churches, electric lighting, and a growing trade. Within recent years it has grown rapidly, owing to the development of its extensive coal fields. Population, 1922, 5,865.

SPRING VALLEY, a city of Illinois, in Bureau County, about 103 miles southwest of Chicago, on the Illinois River and on the Chicago and Northwestern, the Chicago, Rock Island and Pacific, and the Chicago, Burlington and Quincy railroads. The surrounding country produces cereals and fruits and has extensive deposits of bituminous coal. Among the chief buildings are the high school, the public library, and the city hall. It is a market for produce and merchandise. Electric lighting, waterworks, and telephones are among the improvements. Population, 1920, 6,493.

SPRINGVILLE, a city of Utah, in Utah County, five miles south of Provo City. It is situated near the eastern shore of Utah Lake, on surfaced highways and on the Denver and Rio Grande and the Los Angeles and Salt Lake railroads, and is surrounded by a farming and stock-raising country. The industries include a beet-sugar factory, machine shops, and flouring mills. It has an academy, several schools and churches, waterworks and electric lighting. The first settlement in its vicinity was made in 1850. Population, 1900, 3,422; in 1920, 3,010.

SPRUCE, the common name for a class of coniferous trees closely allied to the firs and pines. Many species have been enumerated, some of which attain to great heights and yield valuable timber. The *black,* or *double, spruce* is native to a region extending from Wisconsin to Maine and thrives as far north in Canada as 65°. In most cases the trunk is straight, often seventy feet high, and it bears a conical head. The wood of this species is very strong and is used in shipbuilding, being alike serviceable for the hull, masts, and spars. The *white,* or *single, spruce* thrives farther north than the black and its leaves are somewhat longer. In this species the wood is tough and valuable for construction work. It grows in forests in Wisconsin and several species are native to the Rocky Mountains and California. In some regions the trees are from 80 to 115 feet high. Another species is the *hemlock spruce,* which attains a height of 125 to 175 feet in the native forests of Northwestern America. Another species, the *Douglas spruce,* or *fir,* is found in the western part of North America, extending far north into Canada. The *Norway spruce fir* is a valuable tree of Northern Europe, especially in Norway, and from it the white or Christiania deal is obtained. Trees 150 feet high are common in its native forests.

SPURGE, a genus of shrubs and trees native to temperate and tropical climates, including about 600 species. The representatives found in the temperate regions are mostly herbs, while those common to the warmer latitudes include many large trees. They have a milky and acrid juice and small flowers, and are leafless or the leaves fall off early. Some closely resemble certain cacti. A number are grown as ornamental plants and for their flowers. About forty species are found in the eastern

part of North America, but some of these have been introduced from Europe and Africa.

SPURGEON (spûr'jŭn), **Charles Haddon,** Baptist clergyman, born in Kelvedon, England, June 19, 1834; died in Mentone, France, Jan. 31, 1892. He was the son of a Congregational minister and attended the schools at Colchester and Maidstone. In 1850 he was converted to the Baptist faith and became an active worker in the religious cause, receiving soon after a charge at Waterbeach. He was appointed to preach at a small chapel in London in 1853, but his eminent ability soon made an enlargement necessary, and later he engaged Surrey Music Hall as a place to address his large congregations. In 1861 he promoted the building of the Metropolitan Tabernacle, a structure capable of seating 6,000 persons. His sermons began to be published in 1885, the collection making 2,188 by the end of 1891. He founded a library of 80,000 volumes for indigent ministers, and established a training school for evangelists, besides numerous almshouses, an orphanage, and many chapels. His sermons were delivered with great force and he had them written by a stenographer at the time of delivery. His writings are very numerous and have been widely read. Among the most noteworthy are "John Ploughman's Talk," "Cheque-Book of the Bank of Faith," "Treasury of David," "Gospel of the Kingdom," "Speeches at Home and Abroad," "Types and Emblems," "Storm Signals," and "The Saint and His Saviour."

SPY, the designation applied to a person employed in the time of war to secure information regarding the intent and resources of the enemy, such information being serviceable to the military force or to the nation employing him. The term also has reference to persons engaged for the purpose of keeping officials and various government officers informed regarding probable enemies or opponents, and in this respect the duties of such employees somewhat resemble the work assigned to detectives. Spies were employed for various purposes from remote antiquity, as is evidenced by the circumstance that Moses sent Joshua as a spy to obtain information to be utilized when invading Canaan. The office of a spy is not dishonorable in itself, but the dishonor attached to Major André, Nathan Hale, and other persons acting in the capacity of spies came more largely from their connection with those who had proved traitors to their country, which is frequently the case with those engaging to act in the capacity of spies. It is undoubtedly true that attractiveness is given by the risks accompanying engagements of this kind, especially to persons fond of adventure, but by the laws of war a spy is liable to suffer death.

Many officials and sovereigns employ spies as a means of safety against those liable to attack their person or public institutions. A spy system of this kind is maintained at present by many European monarchs, especially in Russia, where the system is perfect in detail and arrangements. Spies usually dress in the uniform of the enemy and not infrequently in the form of disguise, thus causing the opposing party to be unsuspicious of their intention or designs. They are usually well paid, with the view of insuring loyalty, and are provided with signs and passwords so their identity may be made known to officers of their own country or party. Cooper's "The Spy" is a work of literary value and contains an account of thrilling incidents in the lives of spies.

SQUADRON (skwŏd'rŭn), in military, a body of cavalry, consisting ordinarily of two companies or troops and averaging from 150 to 200 men. The squadron bears the same relation to cavalry that the battalion does to infantry. A detachment of ships of war employed on a particular expedition is usually called a squadron.

SQUARE, in geometry, a figure formed of four equal sides that meet each other at right angles. Square measure relates to the superficial areas of surfaces in square units, as inches, feet, yards, miles, etc. The square in arithmetic is a number that results from multiplying a number by itself; thus, 81 is the square of 9, for $9 \times 9 = 81$. The number thus multiplied is called the *square root,* and the method of finding it in algebraic and arithmetical formulas is known as the *extraction of the square root.* A tool used by carpenters is usually termed a *square,* consisting of a rule of two limbs united at a right angle. The common rule for finding the square contents of a rectangular figure is to multiply the length by the breadth.

SQUASH, the name of several species of plants belonging to the gourd family. They are grown extensively in gardens as a wholesome vegetable for making pies, preserves, and other commodities for table use. The plant is a trailing annual similar to the pumpkin and is planted and cultivated in the same way. Many species have been originated by propagation, but writers generally class them as belonging to four distinct species. Those cultivated include the winter squash, the crook-necked squash, the autumnal, the Yokohama, and the early summer squash. See **Gourd.**

SQUATTER (skwŏt'tĕr), an American term applied to one who takes up his residence on a tract of land without due authority, but whose occupancy of the same is not interfered with by the government or the rightful owner. The term *squatter sovereignty* originated with Stephen A. Douglas, who incorporated it into the Kansas-Nebraska Bill. In this sense it was applied to settlers who entered Kansas for the purpose of aiding in admitting or excluding slavery. Douglas used the phrase *popular sovereignty* to characterize his plan of leaving it

to the inhabitants of each Territory to decide without the interference of Congress whether it should become a free or a slave State.

SQUID, the name frequently applied to the cuttlefish and to many decapod cephalopods. This class of animals is found in nearly all the seas. The several species are more or less valuable in the industries and as food for fishes and crustaceans. See **Cuttlefish; Octopus.**

SQUIER (skwīr), **Ephraim George,** explorer and author, born in Bethlehem, N. Y., June 17, 1821; died in Brooklyn, April 17, 1888. He spent his early life on the farm, where he worked in the summer season, and in the winter taught in the rural schools. Later he edited a newspaper and in 1849 became United States commissioner to the republics of Central America. From 1863 to 1864 he was United States commissioner to Peru, where he was sent to examine the Inca architecture, of which he took several photographs. Later he became consul-general at New York under government appointment by Honduras, and while there spent considerable time in preparing his work entitled "Incidents and Explorations in the Land of the Incas." Other publications include "The States of Central America," "Aboriginal Monuments of the State of New York," "Scenery and Ancient Monuments," and "Treatise on the Antiquities of Ohio." The last mentioned was published in the *Smithsonian Contribution to Knowledge* and resulted from an examination of the antiquities of the Scioto valley.

SQUILL, a genus of plants belonging to the lily family. These plants have a spreading perianth, smooth filaments, and three-seeded cells. They are allied to the hyacinths and many of the species yield beautiful flowers. The most important species is the *sea onion,* which is found on the coast of the Mediterranean. It has a pear-shaped bulb from three to six inches in diameter, which yields medicinal properties useful as an emetic and a purgative. In some cases it is prescribed for treating croup in children and to stimulate the vessels of the lungs.

SQUINTING, or **Strabismus,** a deformity of the eye, resulting from a want of parallelism between the visual axes. One who suffers with this deformity, though he endeavors to fix both eyes on the same object, is unable to direct them to the same place. The eye directed toward the object looked at is called the *fixing eye,* while the other is known as the *squinting eye.* Spasm of the internal straight muscle is sometimes the cause, and in some cases it is due to paralysis. In some instances it is possible to overcome the defect by an operation, which requires making an incision in the mucous membrane and severing the tendon close to the cornea.

SQUIRREL (skwĕr'rĕl), a genus of rodent quadrupeds. They are found in all the continents except Australia. Writers have described many well-marked species, differing widely in size, color, and habits. They are very abundant in the United States and Canada. The squirrels may be divided into the three groups known as tree squirrels, ground squirrels, and flying squirrels. All the squirrels have a more or less slender body, bright eyes, and small, pointed ears. They are graceful and active in their movements. Their hind feet have five toes and their fore feet are four-toed, but the latter have a thumblike projection. They are active and industrious in searching for food, which they lay away for the winter season or for a

TREE SQUIRRELS.

time of scarcity, and their winters are spent mostly in the state of sleep. *Tree squirrels* are usually of a ruddy-brown color on the upper parts, with a reddish-white below, but their color varies somewhat with the season and climate, usually taking on a grayish appearance in the winter. They live largely in trees, where they may be seen with their large, bushy tail projecting over the back and passing from tree to tree with remarkable skill. Squirrels of this class subsist largely on nuts, seeds, and acorns, and their flesh is highly valued as a food.

The *ground squirrels* make their home in burrows in the ground. This class includes several species, of which the gray, striped, and red squirrels are the most common in America.

They feed on seeds, tender shoots of plants, and various cereals. In some sections of the country, especially in the central west of the United States, they are a harmful pest to cornfields, often digging the newly planted seed from the ground, which they locate with remarkable skill. *Flying squirrels* have an extension of the skin connecting their fore and hind limbs, thus forming a sort of parachute, and by aid of this they are able to leap with considerable skill at long distances. In other details they resemble the true squirrels, but differ from the latter in that they roam about at night and are seen less frequently in the daytime. The true squirrels are widely distributed in the forests of North America and most continents and are found only in timbered sections. On the other hand, the ground squirrels are common to many places and frequent both the timber and prairie regions. The flying squirrels are mostly native to Western Asia, but there are species in North America, Siberia, and Eastern Europe. Some species of squirrels yield fur valuable as an article of commerce, especially those of Siberia and other cold regions. See **Flying Squirrel.**

SQUIRREL MONKEY. See **Monkey.**

STABAT MATER (stā'băt mā'tẽr), a celebrated hymn written in the Latin and sung in the Catholic Church during services in passion week. The words *stabat mater,* meaning the mother stood, are the first words of the hymn, hence its name. A Franciscan monk named Jacopone, or Jacopone Benedetti (died 1306), is supposed to have been the author of the hymn. It was set to music by Haydn, Rossini, and a number of other eminent composers.

STADIUM (stā'dĭ-ŭm), the name of a Grecian course for foot races at the places where games were celebrated, and sometimes in the gymnasia where there were no games. The stadium was an oblong area terminating at one end by a straight line and at the other by a semicircle, and ranges of seats rising above one another in steps were provided at the latter. The celebrated stadium at Olympia was 600 Grecian feet long, equal to 606 feet 9 inches in English measurement. Other stadia were at Athens, Delphi, Epidaurus, and Thebes.

STADTHOLDER (stăt'hōld-ẽr), the title given by certain provinces of the Netherlands to the chief executives. When Holland and Zealand revolted against Spain, in 1580, William of Orange was made the chief magistrate, or stadtholder. His son, Maurice of Nassau, was declared stadtholder in 1584, at the time the former was assassinated. The dignity continued in the house of Orange, with occasional intermissions, until 1747, when William IV. was declared hereditary stadtholder. In 1814, after the restoration of the Orange family, the title was exchanged for that of king.

STAËL-HOLSTEIN (stä'ĕl-hōl'stīn), **Madame de,** eminent lady of France, born in Paris, April 22, 1766; died there July 14, 1817. She was the daughter of M. Necker, minister of finance under Louis XVI., and her full name was Anne Louise Germaine Necker. Her mother was puritanic in discipline, but her father accorded the daughter considerable liberties, and allowed her to converse with the eminent men and philosophers who called at his residence, thus giving her an early acquaintance with public life and thought. Educationally she had everything that could be desired, showing remarkable aptitude for literary study. In 1786 she was married to Baron de Staël-Holstein, then Swedish ambassador to France, but two years later separated from him. However, this marriage brought her in touch with the brilliant society of Paris, of which she became the center of attraction because of her remarkable conversational power and personal enthusiasm. When the Revolution of 1789 began, she exercised considerable political power and made an effort to save the queen, even at the risk of being guillotined herself. In 1792 the reign of terror began and she found safety at Coppet, Switzerland, where she spent some time on her father's estate. The following year she became a refugee in England, where she spent four months in literary research, and while there published "Reflections on the Trial of the Queen."

Madame de Staël-Holstein returned to Paris when affairs came under the control of the directory, and Joseph Bonaparte made a vain effort to induce her to assist in shaping affairs favorably to his brother. Later she exercised her influence in favor of Louis XVIII., but on the return of Napoleon was banished from France, largely because of the circumstance that her home was a common resort of those opposed to his government. She spent her time in exile, mostly in Weimar, Germany, where she formed a friendship with Goethe, Schiller, and Schlegel, and devoted herself to literary work and study. Within that period she published "Influence of the Passions" and "Literature Considered in Relation to Social Institutions," two works of much value. In 1804 she visited Italy and was recalled the same year to Coppet, where her father died soon after.

She did not return to France until the restoration of Louis XVIII. At Paris she was received with marked enthusiasm, being accorded a most gracious reception by many men of eminence. Her health soon failed and she sought to restore it by visiting Italy in 1816, but, finding the Italian climate of no material benefit, she returned to Paris and died there the next year. Her will revealed a secret marriage to a French officer named M. de Rocca, who was 21 years her junior. Madame de Staël-Holstein ranks among the most eminent female writers of her period, possessing remarkable originality, enthusiasm, and depth of

tender sentiment. Among her works not mentioned above are "Letters to Rousseau," "Reflections on the Peace," "Considerations Upon the French Revolution," "Life of M. Necker," "Ten Years of Exile," and two tragedies entitled "Lady Jane Grey" and "Josephine."

STAFF, in military science, a corps of officers attached to a commander for the purpose of aiding him in executing his designs. Officers of this class are usually divided into general staff officers, staff corps, and the regimental staff. The *general staff* consists of adjutants general and assistant adjutants general, inspectors general and assistant inspectors general, aids-de-camp, etc., whose duties include the communication of the orders of the general in chief as well as the whole range of the service. *Staff corps* are confined to distinct branches of the service and include such officers as the engineers, topographical engineers, and officials having charge of ordnance, subsistence, medical service, and pay departments. The *regimental staff* includes regimental officers and certain noncommissioned officers, and their duties are similar to those of adjutants general, commissaries, and quartermasters. Schools are maintained in many countries for the special instruction of staff officers. They are required to know the country thoroughly, to superintend the transmission of orders promptly, and to discharge complicated duties intelligibly.

STAG, or Red Deer, a species of large deer native to the northern sections of Europe and Asia. The male, or *hart,* has round, branching horns. They are shed annually and reach their largest size in the seventh year. The female, or *hind,* is hornless and smaller than the male. These animals have a grayish-brown color in the winter and a reddish-brown in the summer, and are classed among the handsomest of the deer family. They have an acute sense of smell and are strong, swift, and watchful. The pairing season occurs regularly in August and the young, or *calf,* is born in May. Formerly these animals were seen in large numbers in Western Europe and they are still found in protected regions, especially in Germany, Austria, and Russia. A class of deer known as the *wapiti* is nearly allied to the red deer of Europe, but is native to North America. Similar species occur in Northern Africa. See Deer.

STAG BEETLE, the common name applied to a large group of insects, including about 550 species. Many of these beetles are of considerable size and receive their name from the large and powerful mandibles of the males. The *common stag beetle* of Europe is about two inches long, exclusive of the mandibles, and has a black or dark brown color. During the day it lives in the trunk of trees, but flies about freely at night, often entering houses and other places where lights are burning. A species called the *horned bug* is common to the eastern part of North America, particularly New Brunswick and New England, and has a mahogany-brown color. It has spread westward and is frequently seen in the evening, especially in the branches of apple, willow, and oak trees.

STAGHOUND, a large dog used formerly for hunting the stag in Europe, whence the name. It is somewhat heavier than the greyhound, has rough fur, and is noted for its strength and swiftness. The scent is developed almost as highly as in the bloodhound, with which it is frequently crossbred.

STAINED GLASS. See **Glass.**

STAINER (stā'nẽr), **Sir John,** composer, born in London, England, June 6, 1840; died March 31, 1901. At the age of seven years he began to sing in the choir of Saint Paul's Cathedral, but gave up singing in 1856, owing to a weakening of his voice. In 1889 he became professor of music in Oxford University and was knighted. Many musical associations and institutions of learning bestowed honors and degrees upon him. He was made a chevalier of the Legion of Honor in 1878. His compositions include "The Crucifixion," "Saint Mary Magdalene," and the "Daughter of Jairus."

STALACTITE (stà-lăk'tīt), the name given to masses of rock resembling icicles in form, which are found attached to the roofs in many caverns. They are caused by the evaporation of water impregnated with minerals, such as lime, pyrites, limonite, and chalcedony. The water laden with minerals of this class penetrates the rock, and the substances solidify as the liquid evaporates. In some instances the stalactites form columns from the roof to the floor, and in such cases the forms resemble curtains, waterfalls, and other phenomena. Sometimes stalagmites are formed, being produced by successive drops of water falling upon the floor, the growth in such cases being upward as the liquid evaporates.

STAMEN (stā'mĕn), that part of flowers which contains the pollen, or male fertilizing element. It consists of a filament, an anther, and the pollen. The *filament* is the tender stalk, or support, and attached to it is the *anther,* which forms a double-celled sac containing the *pollen.* When the anther and pollen are wanting, the stamen is said to be sterile and abortive. The *pistil* is the female part and normally occupies the center of the flower. It is composed of the ovary, with its ovules and stigma. Fertilization takes place when the pollen comes in contact with the pistil. These two essential parts are often in different flowers of the plant and sometimes on distinct plants of the same species.

STAMFORD (stăm'fẽrd), a city of Connecticut, in Fairfield County, on Long Island Sound, 32 miles northeast of New York City. It is on the New York, New Haven and Hartford Railroad and has steamboat connections with New

York and other cities. Stamford is adjacent to a fertile agricultural and fruit-growing country. The notable buildings include the Ferguson Library, the Saint John's Hospital, the Stamford Hospital, two high schools, and many fine churches. Other features include Halloween Park and the Soldiers and Sailors Monument. It has manufactures of iron and bronze wares, drugs, yale locks, musical instruments, boots and shoes, stoneware, and machinery. It is a favorite summer residence and resort. The place was settled in 1641 and incorporated as a city in 1893. Population, 1900, 15,997; in 1920, 35,486.

STAMP, a small piece of paper issued by the government and sold to the public to be attached to letters, documents, and packages liable to the payment of duty. Stamps for the payment of postage on letters and small parcels came into use in England in 1840, where their adoption was suggested by Sir Rowland Hill, and they were generally adopted in the United States in 1847. Each nation now has a system of stamps for its mail service, on which the portrait of some distinguished public man or an ensign is printed, together with the denomination of the stamp. The different stamps used in a nation at the same time vary in number from 75 to 200, this being required to supply various denominations and stamps for different purposes. The first stamp issued in the United States was of the denomination of five cents and bore the portrait of Benjamin Franklin. Fully 125 different stamps have been in use at one time in that country.

Revenue stamps are those issued by the government to be attached to documents liable to duty. The revenue stamp system is a form of taxation, designed in the United States as a war measure to provide revenue for the government. Such a law was enacted at various times. The revenue stamp law passed at the time of the Civil War was not wholly repealed until 1883, when the last articles required to be stamped, including bank drafts, checks, and matches, were made exempt. This law yielded $16,500,000 in 1870. Another law of this kind was enacted soon after the beginning of the Spanish-American War, but it was repealed in part by an act of Congress passed March 2, 1901. The revenue law of 1917 requires stamps to be affixed to deeds, notes and many other documents. The *thrift stamps,* authorized the same year, induced many people to save their earnings by investing them in government securities. Excise taxes, such as those on cigars and alcoholic beverages, also are covered by stamps.

STAMP ACT, a revenue law passed by the British Parliament in 1765. It required that all paper, vellum, and parchment used in the American colonies should be stamped, and declared null and void all legal documents written on unstamped paper. The measure was proposed by George Granville, Chancellor of the English Exchequer, as a means to raise revenue. This aroused such violent opposition in America that all the colonies except Virginia, New Hampshire, Georgia, and North Carolina sent delegates to a congress at New York, which remained in session from the 7th until the 25th of October, 1765. This congress addressed a protest to the king and declared that the colonies could be taxed only by their own representatives in the colonial assemblies. The English looked on the declaration as that of an unconstitutional gathering, but continued opposition finally caused the repeal of the Stamp Act in 1766. This legislation for raising revenue is one of the causes that led to the Revolution.

STANBERY, Henry, lawyer and jurist, born in New York City, Feb. 20, 1803; died June 26, 1881. He studied at Washington College, Pennsylvania, where he graduated in 1819, and was admitted to the bar in 1824. Soon after he removed to Ohio, where he practiced law and was attorney-general of the State. President Johnson appointed him Attorney-General of the United States, which office he held until 1868, when he resigned to become counsel in the impeachment proceedings for the President. Subsequently he practiced his profession in Cincinnati.

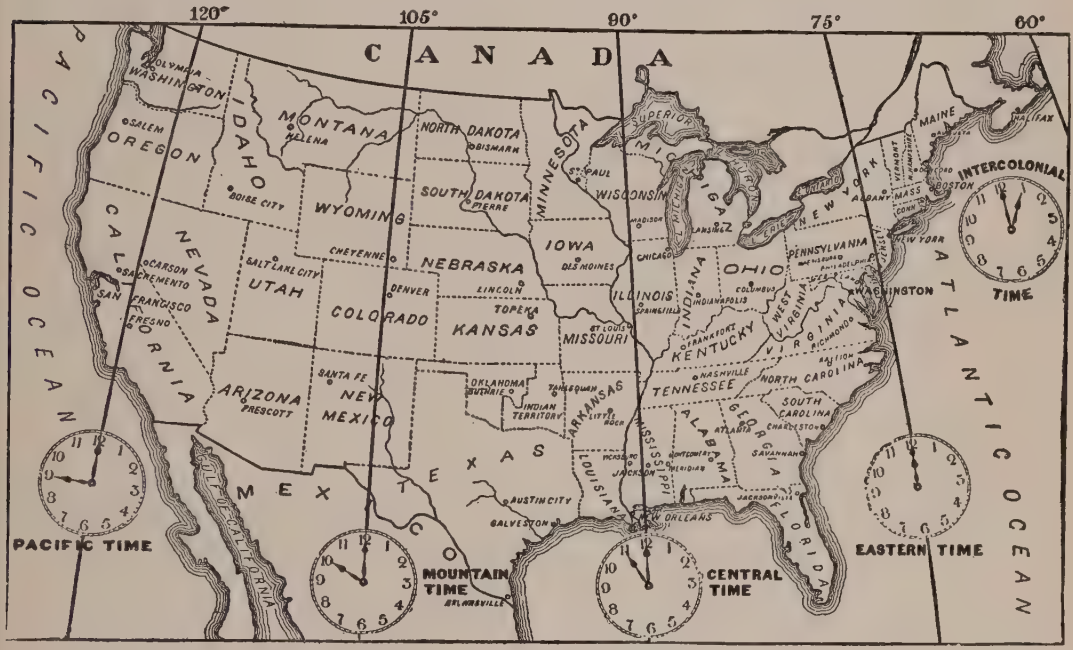
STANDARD TIME, a general system of reckoning time, with the Greenwich meridian as a basis, and adopted by all the principal railroad companies in Canada and the United States. It went into general effect at twelve o'clock, noon, Nov. 18, 1883. The system originated with Professor Abbe, of the signal bureau at Washington, D. C. It divides the continent into four longitudinal belts and fixes a meridian of time for each belt. These meridians are 15° of longitude from each other, thus corresponding to one hour of time, and the time of the four sections is known as Eastern, Central, Mountain, and Pacific.

Eastern time is used in the United States in the territory lying between the Atlantic coast and a line drawn from Detroit, Mich., to Charleston, S. C. *Central time* extends from this line to a line drawn from Bismarck, N. D., to the mouth of the Rio Grande. *Mountain time* includes the region lying between the western limit of Central time and the western borders of Arizona, Utah, and Idaho, and the remainder of the country is within the sphere of *Pacific time.* The lines bounding the different divisions are necessarily irregular, since it is aimed to change the time on trains at important railroad centers. However, Canada has *five divisions* of standard time, instead of *four divisions,* including, besides those named for the United States, the *Atlantic time.* It is well illustrated on the Canadian Pacific, on which it is *Atlantic time* east of Vanceboro; *Eastern time* from Vanceboro to Fort William,

Sault Sainte Marie, and Detroit; *Central time* west from Sault Sainte Marie and Fort Williams to Broadview; *Mountain time* from Broadview to Laggan; and *Pacific time* from Laggan to Vancouver and Victoria.

According to this system of reckoning, places lying within Eastern time have twelve o'clock, noon, when those in Central time have 11 a. m.; those in Mountain time, 10 a. m.; and those in Pacific time, 9 a. m. A traveler passing from one time belt to another finds his watch too fast or too slow, according to the direction in which he is going. All points in any time division using the time of the meridian have their time pieces faster or slower than the time indicated by the sun, according as their time is east or west of the line. The naval observatory at Washington supplies the standard time in the United States. The exact hour of twelve o'clock, noon, is determined every day by astronomical examination, the chronometer of the observatory is corrected, and the correct time is communicated to all the government departments by electricity at the precise hour. Connected instruments are kept in the room of the Western Union Telegraph Company, which telegraphs the time automatically to all parts of the United States, reaching San Francisco in one-fifth of a second. To accomplish this effectually, all business is taken off the wires three minutes before noon each day, thus supplying an unbroken connection between Washington and every point on its lines.

It must be remembered that the noon signal at Washington indicates time in Chicago for eleven o'clock a. m.; in Denver for 10 a. m.; and in San Francisco for 9 a. m. The company provides an electro-magnet to be attached to clocks, and by means of this instrument the hands on the dials are forced to the exact hour in all parts of the United States where connections are maintained. The charge for such connection is $15 per year, and from this source the company receives over a million dollars annually. Standard time has proven a great convenience in railroading and to the traveling public, since the objections to keeping 53 standards of time by railroad companies have been overcome, and the standards are now equal in number to the four regularly recognized time belts.



STANDARD TIME IN CANADA AND THE UNITED STATES.

STANDISH (stănd'ĭsh), **Miles**, colonist and soldier, born in Duxbury, England, about 1584; died in Duxbury, Mass., Oct. 3, 1656. He entered the British army for service in the Netherlands and attained to the rank of captain. In 1620 he sailed for America with the pilgrims on board the *Mayflower* and, after landing at Cape Cod, conducted an exploring expedition to discover a suitable place for the settlement. After founding Plymouth, the colony chose him as captain to command an expedition against the savages, thus making him the first military officer in New England. He visited England in 1625 as agent for the colony and the following year returned with supplies. In 1632 he founded Duxbury and was for many years a member of the executive council and treasurer of the colony. A fine monument 100 feet high has been built to his memory at Duxbury and at its top

is a statue. His courtship of Priscilla Mullins was commemorated by Longfellow in "The Courtship of Miles Standish."

STANFIELD (stăn'fēld), **Clarkson,** eminent painter, born in Sunderland, England, in 1793; died at Hempstead, May 18, 1867. He descended from Irish parentage and at an early ago entered the navy, making frequent voyages to China and other countries in the East. Considerable skill in drawing and painting was developed while in the naval service and, after receiving an injury from a severe fall, he left the navy and engaged in painting theatrical scenes. In 1826 he exhibited a fine picture entitled "Market Boats on the Scheldt" and soon after produced other paintings of merit. He was made an associate of the Royal Academy in 1832 and in 1835 became a full academician. Among his most celebrated paintings are "The Battle of Trafalgar," "French Troops Fording the Margra," "Victory," "Wreck of a Dutch East Indiaman," and "The Bass Rock."

STANFORD (stăn'fērd), **Leland,** public man and philanthropist, born in Watervliet, N. Y., March 9, 1824; died in Palo Alto, Cal., June 21, 1893. After receiving a public school education, he studied law and was admitted to the New York bar in 1849. In the same year he went to California overland to seek his fortune, and, after engaging in gold mining, he settled in business in San Francisco in 1856. He was a promoter of the Central Pacific Railroad and as president of the company superintended its construction. In 1861 he was elected Governor of California as a Republican, and from 1884 until the time of his death served in the United States Senate. His fortune was valued at $50,000,000. He gave $20,000,000 to found the Leland Stanford Junior University at Palo Alto in memory of his son, which institution has courses covering all the important branches of education. His widow, Jane Stanford, died Feb. 28, 1905.

STANHOPE (stăn'ŭp), **Lady Hester Lucy,** public benefactress, born in Kent, England, March 12, 1776; died June 23, 1839. She was the eldest daughter of the third Earl of Stanhope (1753-1816). Her father was an inventor and scientist and a friend of popular government. She lived with her uncle, William Pitt, for three years, of whose household she was manager, and at his death was granted a pension by the King of England. In 1810 she left England to search for a home in Palestine and, after extensive travels through the East, finally settled on Mount Lebanon. She became a Mohammedan in religion and custom, and from her seat of influence wielded almost absolute authority over the surrounding district. Albanian natives fortified and garrisoned the convent that she made her home, which became the refuge of many in need and distress, especially a large number of refugees after the siege of Acre. She came to actual financial straits because of her liberality, but was supported by her Mohammedan friends, who regarded her a prophetess Several interesting accounts of her life in the East have been published by travelers.

STANHOPE, Philip Henry, Earl, statesman and historian, born in Walmer, England, Jan. 31, 1805; died at Bournemouth, Dec. 24, 1875. In 1827 he graduated from Oxford and three years later entered the House of Commons, where he became a potent and influential factor. He was a strong advocate of the copyright law passed in 1842, and from 1845 to 1846 served as Secretary of the Indian Board of Control. In politics a Conservative, he was an intimate friend of Robert Peel and was made an earl in 1855. His numerous writings include "Memoirs of Sir Robert Peel," "History of England from the Peace of Utrecht to the Peace of Versailles," "War of the Succession in Spain," "Life of Louis, Prince of Condé," and "History of Spain under Charles II." He was one of the founders of the National Portrait Gallery.

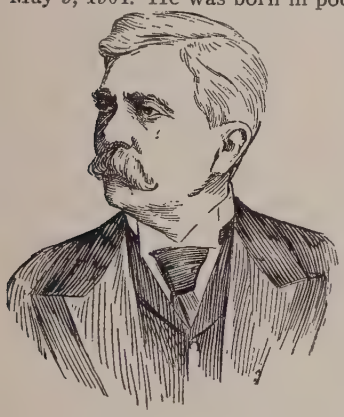
STANISLAS I. LESZCZYŃSKI (stăn'ĭs-lâs lyĕsh-chĭn'y'skĭ), King of Poland, born at Lemberg, Galicia, Oct. 20, 1677; died Feb. 23, 1766. He descended from a wealthy and noble Polish family and was made palatine of Posen. In 1704 he was made King of Poland, being supported by the King of Sweden. He lost the throne in 1709 as a result of the Battle of Poltava, at which Charles XII. of Sweden was defeated by Peter the Great, who restored Augustus to the throne of Poland. In 1725 his daughter Maria married Louis XV. of France and he was restored to the Polish throne in 1732, but was again dispossessed by the Treaty of Vienna in 1735, who recognized Augustus III. as King of Poland. Subsequently Stanislas received the duchies of Bar and Lorraine and maintained courts at Lunéville and Nancy, where he encouraged learning and gathered about him men of science.

STANISLAS II. AUGUSTUS, King of Poland, born at Wolczyn, in Lithuania, in 1732; died in 1798. He was elected to the Diet of Poland, in 1752, and subsequently represented that country at the court of Russia, where he gained the favor of Catharine. In 1763, on the death of Augustus III., he was a candidate for the throne of Poland, to which he was elected the following year. His administration was unsuccessful through the disagreement of the nobles, and his country was thrown into a condition of anarchy. In 1795 he resigned the crown, his kingdom having been partitioned by Austria, Prussia, and Russia.

STANLEY (stăn'lĭ), **Arthur Penrhyn,** eminent scholar and divine of the Anglican Church, born in Cheshire, England, Dec. 13, 1815; died at Westminster, July 18, 1881. He was the son of Edward Stanley (1779-1849), the rector of Alderley, and studied under Dr. Arnold at Rugby. In 1834 he was admitted to Oxford University, where he became a fellow, and was

admitted to holy orders in 1839. The following year he made a prolonged tour in Italy, Greece, and Asia Minor, and in 1841 settled at Oxford, where he served as tutor of Balliol College for ten years. He became canon of Canterbury in 1851, was made professor of ecclesiastical history and canon of Christ Church in 1856, and became dean of Westminster in 1863. Stanley was liberal as a theologian, considering the prevailing spirit of his time, and frequently invited clergymen of the Scottish and other churches to address his congregation. In many instances he held union meetings. His work entitled "Sinai and Palestine" is the result of an extended tour through Egypt and Palestine in 1852 and 1853, and his "Eastern Church" was written after traveling through Russia in 1857. Other writings include "Essays on Church and State," "Life of Arnold," "Memoir of Bishop Stanley," "Historical Memoirs of Westminster Abbey," "Three Irish Churches," "Christian Institutions," "Lectures on the Church of Scotland," and "Memorials of Canterbury." He was buried at Westminster, in the chapel of Henry VII.

STANLEY, Sir Henry Morton, eminent explorer, born in Denbigh, Wales, in 1841; died May 9, 1904. He was born in poor circumstances and at the age of three years was placed in the poorhouse of Saint Asaph. His early name was John Rollands, by which he was known until he worked his way as a cabin boy to New Orleans, in 1855, when he was adopted by a merchant and took the name of his benefactor. His foster father died soon after and he entered the Confederate army, serving in several engagements, but, after being captured by the Union army, entered the United States navy as a volunteer. He was assigned to the ironclad *Ticonderoga* and left the service at the close of the war as an ensign. Soon after the war he engaged as correspondent of the New York *Herald,* which paper sent him to Turkey in 1866 to report upon the Cretan revolution, and subsequently he traveled extensively in the Levant. In 1868 he joined the expedition against Abyssinia under General Napier, and while reporting secured distinction by getting his account of the Battle of Magdala to London before the official dispatches reached there. In the later part of the same year he proceeded to Spain to report the revolution against Queen Isabella, and while there received word from the New York *Herald* "to go and find Livingstone."



HENRY MORTON STANLEY.

Stanley started overland from the Crimea to Bombay, visiting and reporting different parts of Palestine, Persia, Burmah, and the opening of the Suez Canal, and in January, 1871, reached Zanzibar. Shortly after he entered upon his famous expedition into the heart of the unexplored region, taking with him a band of experienced natives and extensive equipments for a prolonged journey. His force consisted of 200 men and the journey occupied 234 days, being delayed somewhat on account of sickness and native hostilities. He found Livingstone at Ujiji, on Lake Tanganyika, in November, 1871, and the two men spent four months in exploring the great lakes sufficiently to prove that Lake Tanganyika has no connection with the Nile but belongs to the Congo basin. In 1872 he returned to England, where he received royal honors and published "How I Found Livingstone," a work that proved highly profitable. The New York *Herald* employed him to report the Ashanti campaign soon after, and he returned to England at an opportune time to witness the burial of Livingstone in Westminster Abbey.

Stanley organized a second expedition to penetrate Africa in 1874, under the joint direction of the New York *Herald* and the London *Daily Telegraph.* Leaving England in August, 1874, he arrived at Zanzibar in the later part of that year and early in 1875 reached Victoria Nyanza. His company consisted of 350 men, but one-third of these died while on the march to Lake Victoria. After exploring lakes Victoria and Albert Nyanza, proving the latter to be a tributary of the Nile, he proceeded across the continent of Africa and reached the mouth of the Congo in 1877. He now sailed from the mouth of the Congo to Zanzibar, where he dismissed the surviving members of his company and in 1878 reached London. The founding of the Congo Free State is a direct result of this expedition, although it was established under the protectorate of Leopold II. of Belgium. Stanley was engaged soon after to explore and establish stations in that region, where he spent the four years between 1879 and 1884 and in the latter year returned to the United States. He entered upon the famous expedition to relieve Emin Pasha in 1887. While this enterprise was heralded to be in the interest of humanity, it was in fact to lessen German influence in equatorial Africa and extend the authority of Great Britain, though it is thought Stanley was not fully aware of the intent of those who promoted it.

Leaving Zanzibar in the spring of 1887 with 700 men, he proceeded to the mouth of the Congo River by way of the Cape of Good Hope, and thence followed that stream to the mouth of the Aruwimi River. After passing through a trackless forest and discovering the Ruwenzori Mountains, he finally arrived at the banks of Lake Albert Nyanza in January, 1889, and in

December of the same year Emin Pasha and Stanley reached Bagamayo. On returning to England, in 1890, he married Dorothy Tennant, made a lecturing tour in the United States, and subsequently became a naturalized citizen of England. In 1895 he was elected to Parliament as a Unionist candidate and received a degree from Oxford. His writings include "In Darkest Africa," "Through the Dark Continent," "Slavery and the Slave Trade in Africa," "Congo and the Founding of the Free State," and "My Dark Companions and Their Strange Stories."

STANOVOI (stä-nô-voi'), a range of mountains in the northeastern part of Asia, situated in Eastern Siberia. It extends from the border of Mongolia, southeast of Lake Baikal, in a northeasterly direction to Bering Strait. On the frontier of China it merges with the Altai Range to form the Yablonoi Mountains. Several spurs run from the main range, including one that extends to the Sea of Japan and another that runs parallel with the Lena River almost to the Arctic Ocean. The culminating peak is Mount Tehokhondo, or Sokhondo, in the southern part, which has an altitude of 8,150 feet. The range has a length of 3,000 miles and the general elevation does not exceed 3,250 feet. Fine forests of valuable timber cover many of the slopes in the southern part, but the extreme northern extension is entirely barren or is characterized by a small growth of shrubs.

STANTON (stăn'tŭn), **Edwin McMasters,** statesman, born in Steubenville, Ohio, Dec. 19, 1814; died Dec. 20, 1869. After graduating from Kenyon College at Gambier, Ohio, he studied law and in 1836 was admitted to the bar. He first practiced law at Cadiz and later at Steubenville, and soon after was appointed reporter of the supreme court of Ohio. In 1848 he located in Pittsburg to practice law, and in 1859 removed his office to Washington. President Buchanan appointed him Attorney-General of the United States to succeed Jeremiah S. Black, the latter having been promoted to the position of Secretary of State. This period was one of intense excitement, owing to the withdrawal of the United States troops from Charleston harbor, and at the accession of President Lincoln he resumed the practice of law. When Simon Cameron resigned as Secretary of War to accept the mission to Russia, Lincoln selected him as war secretary. His administration of that department was very energetic and, when Johnson succeeded to the Presidency, serious difficulties arose, which finally caused his suspension in 1867. Congress restored him in 1868 and the House of Representatives impeached the President, but Stanton resigned in the same year, receiving from Congress a vote of thanks for faithfulness and efficient services. President Grant appointed him a justice of the Supreme Court, but he died before entering upon the duties of that office. His son, Louis M. Stanton, published "Memoir of Edwin M. Stanton."

STANTON, Elizabeth Cady, reform advocate, born in Johnstown, N. Y., Nov. 12, 1815; died Oct. 27, 1902. She was the daughter of Daniel Cady. The inequality of women in matters of law and politics first came to her notice while in the office of her father. In 1840 she was married to H. B. Stanton, and in 1848 joined Lucretia Mott (1793-1880) in organizing the first woman's convention at Seneca Falls, N. Y. Subsequently she became noted as an able advocate of woman's rights, lecturing and writing extensively on that subject. In 1888 she served as president of the International Council of Women. She joined Susan B. Anthony and Matilda J. Gage in publishing "History of Woman's Suffrage." Her husband, Henry Brewster Stanton (1805-1887), was an able journalist and public man. He first served as writer for the Rochester *Monroe Telegraph,* joined the anti-slavery movement, and in 1840 attended the anti-slavery meeting in London. Soon after returning to the United States he became editor of the New York *Sun.* He published "Sketches of Reforms and Reformers in Great Britain and Ireland."

STARCH, an important principle of plants, which occurs in greater or less quantity in the seeds, pith, and tubers of all plants except the fungi. It is especially abundant in the tubers of the potato and in the seeds of cereal plants, as in corn. Starch abounds in the interior of many plants, as that of the sago, and in the barks and fruits, as in the bark of cinnamon and in apples. It is formed of small grains or granules, which differ in size and appearance according to the source, thus making it possible to distinguish the various kinds sold in the trade. In a pure state it consists of a snow-white powder and, when pressed with the fingers in a dry state, it causes a slight crackling noise.

Starch is insoluble in water and alcohol, but, when it is rubbed with water in a mortar with rough sides, a small portion of the interior of the granules appears to dissolve. When it is boiled with a large quantity of water, the granules burst and a turbid liquid is obtained on cooling; this contains some soluble starch and holds in suspension the insoluble portion. It forms a gelatinous mass, called *starch paste,* when heated with water to about 150°. *Dextrine* is made by heating starch to about 120°. It is soluble in water, has a pale yellow color, and is the gummy substance used on postage stamps and as a mucilage. Sugar results when starch is boiled in a diluted form of sulphuric acid.

Starch is the substance that makes the grains of cereals and the seeds of many plants nutritive. Vegetables, herbs, and greens are constituted largely of cellulose, which is chemically allied to the starches, but it affords little or no nutriment. It is useful in distending the alimentary canal, thus giving the digestive juices a greater action on the starches. Human saliva, malt, and dilute acids convert the starch into

grape sugar or glucose, under conditions of warmth and moisture. Rice contains 75 per cent. of starch; corn, 56 per cent.; wheat, 54.7 per cent.; barley, 46.3 per cent.; rye, 45 per cent.; beans, 37.7 per cent.; oats, 36.5 per cent.; and potatoes, 18.5 per cent. Thousands of tons of starch are converted annually into glucose and dextrine by treatment with heat and mineral acids. *Cornstarch* is made from corn, which is first cleaned and soaked in water for three days. The soft and pulpy grains are then pulverized in a grinding mill and the pulverized mass is strained through sieves, this serving to separate the husks and germs of the corn from the starch. The starch is allowed to settle in vats filled with water, after which the water is run off, and the starch is washed repeatedly to separate from it the gluten and other foreign substances. It is next bleached and dried, and soon after it is prepared in convenient packages for the market.

Wheat starch is made in a similar way and its higher cost causes its use to be confined to fine laundry work. *Potato starch* is obtained by crushing or grinding the potatoes, then washing the mass thoroughly, separating the foreign substances, and finally placing it in the dry room. Several hundred starch factories are operated successfully in the United States, the most important being at Oswego, N. Y., and Glen Cove, Long Island. Cornstarch is manufactured the most extensively, and, besides being a wholesome food, it is used for various purposes in manufactures, especially in making calico and other textiles, mucilage, and glucose. Large quantities are consumed for laundry purposes. The liver of all healthy vertebrate animals contains animal starch, which is called *glycogen* from its property of being converted into *starch sugar,* or *glucose.* It has some resemblance to vegetable starch.

STAR CHAMBER, an English court of civil and criminal jurisdiction at Westminster, so named from the gilt-star decorations of the ceiling of the room in which it was held. This court was founded by Henry VII., in 1487, and consisted of four high officers of state, with power to add to their number a bishop and temporal lord of the council, and two justices of the court of Westminster. Its jurisdiction extended to cases of riot, perjury, forgery, conspiracy, libel, and other misdemeanors of public importance. Trials were conducted by a method of questioning, but the accused was given the right to confess. The latter practice developed into widespread abuse, torture being employed to extort confessions, and Parliament accordingly abolished it in 1641. This court had the power to inflict any punishment aside from death.

STARFISH, a class of marine animals, which have a starlike body composed of a central disc extending into five or more rays. They belong to the radiates, a class of animals having a central focus with raylike projections and the body covered with a leathery skin. The mouth is in the center, at the under side, and from it is an opening into the stomach, which extends by two branches into each ray. Movement is effected by peculiarly formed tubular feet, which are protruded against the bottom, where they crawl in search of food. At the end of each ray is a reddish speck, which constitutes the eye, but its sensitiveness to light is not highly developed. Reproduction is by eggs, vast numbers being laid in the spawning season. Starfishes are very greedy eaters and in many places prove a pest by devouring the bait of fishermen. They are found widely distributed in tropical seas, assuming smaller forms toward the colder waters, and extend in the Atlantic from Mexico to Greenland. They vary in diameter from one to fifteen inches. Fossil starfishes occur as early as the lowest Silurian epoch, whence they continue to the present time.

STARFISH.

STARK, John, noted general, born in Londonderry, N. H., Aug. 28, 1728; died in Manchester, N. H., May 8, 1822. He descended from a pioneer family and his early life was spent in the frontier region of New Hampshire. The Indians captured him when yet a youth and adopted him into the Saint Francis tribe. In the French and Indian War, in 1858 and 1859, he served as captain, and at the beginning of the Revolution raised recruits to assist the colonies. After serving with ability at the Battle of Bunker Hill, he led a colonial force into Canada, and subsequently served at Trenton, Princeton, and Bennington. The Continental Congress promoted him to the rank of brigadier general after the last mentioned battle, and in the latter part of 1777 he resigned his command. When Burgoyne's invasion called out the New Hampshire militia, the soldiers demanded him as a commander, and he prevented that general's retreat from Saratoga. Later he served in Rhode Island and New Jersey, and in 1781 was made commander of the northern department. "The enemy must be beaten, or Molly Stark will be a widow," is an expression made by him at the Battle of Bennington. After the war he lived in retirement and was the last surviving general of the Revolution except Sumter.

STARLING (stär'lĭng), a genus of birds allied to the crow family. They occur in Europe, Asia, and North Africa. The bill of the common European starling is long and pointed, the color is blackish with shadings of green and purple, and at the extremity of the feathers is a whitish speck. The female has less beautiful plumage than the male, and both sexes are more speckled in winter than in summer. This species is found in all parts of Europe, except the extreme north,

EUROPEAN STARLING.

and in most parts of Asia and Africa. The nest is built of twigs and grass, usually in hollow trees and old walls. Several species build in boxes provided for them near houses. They can be taught to speak some words and whistle tunes when confined in a cage. The *meadow lark* (q. v.) of North America is an allied bird, but is larger than the European starling.

STAR OF BETHLEHEM, a bulbous rooted plant of the lily family, resembling the hyacinth. The leaves are narrow and the flowers are variously colored, usually white or yellow, and are quite fragrant. Many species have been described, some being extensively cultivated in flower gardens. Those best known are native to France, Switzerland, and Germany. Several species are indigenous to Asia and Africa. The flowers open at eleven o'clock in the forenoon and close at three in the afternoon. From this circumstance they are sometimes called *Johnny-go-to-bed.*

STAR ROUTE, the name given in the United States to the postal lines over which the mail cannot be carried by railroad or steamboat and, instead, is conveyed by stage or on horseback. They are so named because in the route book of the Post Office Department they are marked with a star (*). Routes of this kind are very numerous in the mountains and in sparsely settled districts, but short distances are covered by the mail service in this way even in densely populated districts. In 1881, during the administration of President Hayes, certain frauds, known as the *Star Route Frauds,* were discovered and exposed in connection with this service by the government. Those interested in these frauds had increased the compensation for carrying the mails from $143,169 to $622,808, and the profits were divided among the large contractors and some government officials. Those implicated included Thomas J. Brady, second Assistant Postmaster; Stephen W. Dorsey, Senator from Arkansas; and a number of subordinates in the Post Office Department. Dorsey and Brady were tried, but not convicted, and only one of a large number indicted was ever punished. However, the irregularities complained of were ended and the combination was broken up.

STARS, the group of heavenly bodies which are situated outside of our solar system, differing from the planets in being self-luminous. All the planets present a sensible disc when examined with a telescope, or even with the naked eye, but the strongest instruments fail to show that the stars are more than mere points of light, and their light, instead of being regular, continually twinkles. It is not known definitely why the light from the stars presents a twinkling appearance to the eye, but it is thought to be due to the presence of particles of dust, vapor, and other substances within the belt of air that surrounds our planet. Careful examination has revealed a slight twinkling effect of the light coming to us from the planets, moon, and sun, but their being nearer to us causes the light to come from several points, tending to produce a steady impression, while the light emanating from the stars proceeds from an apparent point and is thus interfered with. The movement of the planets can be easily observed by the naked eye, but by superficial examination it is impossible to detect any movement of the stars. Ancient astronomers called them *fixed stars* for this reason, a term still frequently applied, but it has been successfully established that they are not fixed in space in regard to each other. They appear to move from east to west, though this apparent motion is due to the revolution of the earth upon its axis. However, some apparently pursue a path of revolution, and it is reasonable to infer that a heavenly body cannot remain permanently at rest.

Stars are classified in groups, called *constellations,* for convenience in study and description, and some of them were named from their supposed resemblance to some figures, such as perching birds, contorted snakes, and fierce animals. With a few exceptions, the likeness is purely fanciful. The stars constituting the constellations are distinguished by the letters of the Greek alphabet and of the Roman alphabet, and, when the letters of the two alphabets have been exhausted, then numerals are employed. Though no magnitude in a proper sense has yet been discovered in any star, the term is applied to distinguish them according to brightness. The brightest stars visible to the naked eye are of the *first magnitude,* and the faintest of the *sixth magnitude,* while all stars that cannot be seen without the telescope are called *telescopic stars,* these ranging at present to the *sixteenth magnitude.* Astronomers assert that the number of

stars of successive magnitudes increases nearly in geometric proportions, as follows:

1st Magnitude	20	6th Magnitude	5,000
2d "	65	7th "	20,000
3d "	200	8th "	68,000
4th "	500	9th "	240,000
5th "	1,400	10th "	720,000

At present it is considered that the star Centauri, in the southern heavens, is the nearest to the earth. The distance is about 200,000 times that of the earth from the sun, or 19,000,000,000,000 miles. This distance is so great that our imagination fails to grasp the thought or form a picture of the vast void across which we are gazing. Since this is the nearest of the stars, it is not difficult to realize how immeasurably farther other heavenly bodies are situated from us. It is evidenced from this that the stars cannot shine like the planets or the moon, by reflecting back the light of the sun, but instead are self-luminous bodies, and doubtless are the centers of solar systems lying far beyond our own. Few persons can discern more than 4,000 stars with the naked eye, although persons with keen eyesight may discern fully 6,000, and the most powerful telescope is able to reveal a total of about 600,000 in the northern and southern heavens. The stars seem to be irregularly distributed, with here and there groups apparently belonging to a particular system. In some portions only a few stars are to be seen and in others they are apparently crowded into close proximity, as in the *Milky Way*. The light coming to us from the stars is variously colored, but spectrum analysis has revealed that their composition is similar to that of our earth, the light indicating the presence of mercury, iron, hydrogen, magnesium, sodium, bismuth, and other familiar substances. Some shine with light of a yellow tinge, while others show traces of purple, orange, green, blue, yellow, red, and indigo, and the light of some is perfectly white.

The German astronomer, Friedrich W. A. Argelander (1799-1875), estimated that the total light coming from the stars is equal to one-eightieth of the average full moon. The light of some appears to undergo periodic changes by increasing and diminishing in brightness; such stars are called *periodic*, or *variable*. Others catalogued by astronomers in ancient times have entirely disappeared and are known as *temporary stars*. Powerful telescopes have revealed that some of the brightest stars really consist of two or more situated in the same part of the heavens, these being called *double* and *multiple stars*. The star Arcturus and several others are apparently coming nearer to the earth, while Sirius is receding. Nothing definite is known regarding the size of stars, since their light may be modified by a difference in their distance, size, or intrinsic brightness, and for this reason the faintest stars may not be the most distant from the earth. It is estimated that the light proceeding from Sirius surpasses that of the sun 64 times.

STARVATION (stär-vā'shŭn), or **Inanition**, the condition of exhausted vitality and waste of tissue, followed by death from a want of food. Scant and impure food is the cause of slow starvation, and this form sometimes results in man from a deficiency of constituents necessary to a mixed diet. The absence of both food and water causes man to die in from five to ten days, depending upon age, vitality, and climatic conditions, but a supply of water may extend the period of life somewhat. Usually the weight of the body is reduced to three-fifths of the usual weight before life ceases. We learn from animals that hibernate, such as some species of the bear, that the body is supplied with a large per cent. of adipose tissue, which serves to sustain life, while waste is reduced to a minimum by breathing slowly and a decrease in the beating of the heart. Among the effects of starvation before death ensues are a softening of the mucous membrane, the loss of power to resist cold, severe pain in the head and stomach, and finally violent convulsions. Adults survive longer than the young.

STATE, the name applied generally to a community that is organized under permanent law and has an independent government. The conditions of organization are numerous, differing vastly in form, but the purport of the state is universally to maintain justice and the security of all its members. In a certain sense it is coöperative, especially where the right of suffrage is general or at least vested in a large part of its citizens. With regard to its character, it is said to be paternalistic or individualistic, depending upon whether the state discharges functions that relate to the close supervision of industries and public utilities, or confines itself to the maintenance of peace, the punishment of crime, and the perpetuity of itself as a commonwealth. All states have been justified by referring their origin to God, even the maintenance of democracy, and their early development was through the influence of patriarchs that perpetuated itself.

In ancient times, Plato and Aristotle, as well as others of high repute, held to the view that the city should be the nucleus of the state, giving form and character to the public mind by reason of its higher advancement in arts and education. During the Middle Ages a powerful sentiment grew up in favor of an alliance between the church and state, and this form was discussed by such writers as Aquinas and Dante. Machiavelli, on the other hand, sought to divorce politics from theology and ethics, but advocated a strong central monarchical government. Natural rights were made the basis of government in the theories of Locke and Rousseau, while Thomas Hobbes used the theory of natural law to defend absolutism. These writers sought to solve the problem of government without making history a primary basis, while Montesquieu referred political science to the history of past

events, upon which he based his theory of government.

The United States of America and the Commonwealth of Australia are divided into political divisions known as *states.* However, the name states in this sense is a designation of a division rather than that of a sovereign political organization. The states referred to do not possess many of the powers of an independent government, such as declaring war and making final decisions in judicial causes of a national character, these powers being reserved by the central or federal government. The name *province,* as used in Canada, is equivalent to the word *state,* as used in Australia and the United States.

STATE, Department of. See **United States, Departments of.**

STATEN ISLAND (stăt'ĕn), the largest of several islands in New York harbor, which forms the whole of Richmond County. It is separated from Long Island by the Narrows and from New Jersey by Staten Island Sound. The length is thirteen miles, the greatest width is eight miles, and the area is 58 square miles. Steamboat connections are maintained between it and New York City, to which it was annexed within recent years. The surface is of a rolling character, with soil well adapted to farming and gardening, and it has a number of thriving villages and towns. All the shore villages and Richmond, the county seat, are reached by rapid transit. Many of the villages are noted as summer resorts, being improved by fine gardens and commodious hotels and lecture rooms. The towns have good public school and church facilities. Staten Island has numerous manufacturing establishments, including machine shops, cigar factories and mills. It is the seat of Sailors' Snug Harbor, a retreat for disabled seamen, and has several hospitals. Population, 1920, 116,531.

STATES-GENERAL (stāts'jĕn'ĕr-ăl), the name of the legislative body of the Netherlands. It is composed of two chambers, an upper and a lower, members in the former being elected by the provincial states and in the latter by the citizens. In the history of France the name of States-General has reference to the assembly made up of the nobility, the clergy, and the third estate, or the *bourgeoisie.* It is thought to have originated with Charlemagne, but the first convocation of which there is an authentic record is that of 1302, which assembled as directed by Philip the Fair, who convoked it to give greater weight to his policy in the quarrel with Pope Boniface VIII. Subsequently absolutism spread in France and there was no convocation until 1614. From that time until 1789 there was no assembly of this body, but in the latter year the Third Estate refused to abide by the regulation agreed upon between the other two orders.

STATES' RIGHTS, the doctrine that every State is sovereign within the limit of its own sphere of action, made so by the declared will of the nation as expressed in the Constitution, and that the nation may not abridge or abrogate that sphere. The rights of the national government are distinctly stated in the Constitution, and the rights of the states are limited only by the expressly declared national right. All concede that both the nation and the states have certain rights, and in this respect both have more or less clearly defined powers. The term has often been misapplied to the doctrine of *State sovereignty,* which implies that the states, at the formation of the Union, delegated a portion of their sovereignty to the national government, reserving the right to revoke the agency and resume the exercise of all the elements of sovereignty at any time by seceding.

State sovereignty was first asserted by the legislatures of Virginia and Kentucky, in 1798, when they formerly protested against the Alien and Sedition Laws, by which the President was empowered to punish sedition in the states and to remove any alien or foreigner whose presence was a source of danger. The doctrine was asserted by Henry Clay and the State of Maryland in 1811 and in 1819, who declared that Congress did not possess authority to charter the United States Bank. Another instance is found in the convention held in South Carolina in 1832, which declared the high protective tariff null and void, but trouble was averted by passing Clay's Compromise Bill. The doctrine of State sovereignty became the ally of slavery soon after the nullification troubles, and the Southern States carried into effect its principles by seceding from the Union, but the Civil War greatly modified the doctrine. However, in a modified form it still has a place among the live public questions. This is exemplified in the issues involved in the regulation of interstate commerce and certain legislation by the states, as in the controversy about the attendance of Japanese upon the schools of California, in 1909.

STATICS (stăt'ĭks), the branch of dynamics which treats of forces that counterbalance one another, hence produce no motion or change of motion. Some writers use the word statics in opposition to dynamics, in which sense the former is the science of rest, of equilibrium, and the latter that of motion, both together constituting mechanics.

STATISTICS (stă-tĭs'tĭks), the science which relates to the collection and arrangement of important facts, such as have reference to the financial, social, intellectual, and political conditions and resources of a state or nation. Though some departments of statistical knowledge are of very ancient origin, the credit of founding the science of statistics is credited to Professor Achenwall (1712-1772), of the University of Göttingen, who treated the subject freely in his "Outlines of Political Science." In this work he called attention to the fact that the statistics of the political science of the several nations is very differently understood, and that there is no general agreement in the number and arrange-

ment of the parts treated in books on the subject. From this work the title *statistics* came into general use, and now the collection of facts and data relating to this subject is an important function of all civilized governments. Practically all nations take a general census at stated intervals, usually every ten years, and in many cases enumerations of population and industrial data are made every five years, as in Germany and some states of the United States.

STATUTE (stăt'ût), a law established by the act of a representative assembly, such as a legislature, congress, or parliament. Statutes enacted by the lawmaking branch of the general government are termed *national,* while those of a state or province are called *state,* or *provincial,* statutes. Where a statute is enacted by the legislature of a state or province, it must necessarily be in conformity with the written or understood constitution of the nation, otherwise it is void on account of being unconstitutional. A statute is said to be *mandatory* when it directs the performance of an act, as in the case of public officials or in authorizing the organization of corporations; *prohibitory,* when it forbids the commitment of an act; *directory,* when it does not definitely specify certain acts, as the time and manner of filing certain official reports; and *permissive,* when it leaves certain acts of a citizen optional, as the disposition of property by will.

STAUBBACH (stou'bäg), a waterfall of Switzerland, in the canton of Bern, 7 miles southeast of Interlaken. The descent is nearly 900 feet, hence it is the highest fall in Europe. In Germany the name means *dust stream,* having reference to the appearance of the water, which is quite similar to a spray of dust some distance before the valley below is reached.

STAUNTON (stạn'tŭn), a city of Virginia, county seat of Augusta County, 38 miles north of Lynchburg, on the Chesapeake and Ohio and the Baltimore and Ohio railroads. It is surrounded by a fertile farming region. The manufactures include flour, musical instruments, fertilizer, brick, ironware, and machinery. Among the noteworthy buildings are the county courthouse, the Masonic Temple, the Fairfax Hall, the high school, and the public library. It is the seat of the Western State Insane Asylum, the Virginia Institute for the Deaf, Dumb, and Blind, and the Staunton Military Academy. Highland Park and Gypsy Hill Park are fine resorts. It has a growing trade in farm produce. The place was settled in 1745 and became a city in 1871. Population, 1900, 7,289; in 1920, 10,617.

STAVANGER (stä'vång-ĕr), a city of Norway, at the head of Bukken Fiord, an inlet of the North Sea, 190 miles southwest of Christiania. The chief ecclesiastical building is a Gothic cathedral, one of the finest in the country, and it has a number of fine schools and public buildings. The harbor is safe and commodious and the city has a large foreign trade in fish, timber, and marble. It has shipyards, machine shops, cotton and woolen mills, brickyards, and manufactures of clothing. Communication inland is by railway and electric lines. The public utilities include electric and gas lighting, waterworks, and sewerage. Population, 1920, 37,118.

STAVROPOL (stäv'rô-pôl-y'), a city in southern Russia, capital of the government of Stavropol, on the northern slope of the Caucasus Mountains, 200 miles southeast of Rostof. It has an extensive trade in sheep, horses, cattle, and merchandise. Among the features are electric street railways, stone and asphalt pavements, and several government buildings. The province of Stavropol borders on the Caspian Sea and is watered mainly by the Kuma and Kuban rivers. It produces large quantities of cereals and live stock and is important as a silk-producing region. The city in 1922 had a population of 46,445.

STEAD, William Thomas, journalist and author, born at Embleton, England, July 5, 1849; **died** April 15, 1912. His father, a minister, directed his early training with a view of having him engage in a business career. In 1871 he became editor of the *Northern Echo,* a periodical published at Darlington, and served efficiently until 1880, when he was made assistant editor to John Morley on the *Pall Mall Gazette.* From 1883 until 1890 he edited this publication, and in the latter year founded the *Review of Reviews.* Subsequently he established similar periodicals in the United States and Australia, and was a leading spirit in the introduction of published illustrations and interviews in the daily newspapers of Great Britain. His vigorous exposure of crime in large cities resulted in the passage of the criminal law amendment bill in 1885. His publication entitled *War Against War* was started in 1898 as an opponent to the British war in South Africa. Among his many published works are "If Christ Came to Chicago," "Truth About Russia," "Maiden Tribute of Modern Babylon," "Story that Transformed the World," "Satan's Invisible World," "A Study of Despairing Democracy," "Americanization of the World," "Mr. Carnegie's Conundrum," and "Last Will and Testament of Cecil John Rhodes."

STEAM, the gaseous form of water, especially the gas into which water is changed by boiling. It is a colorless and transparent gas when the water has been vaporized to an extent that none is held in mechanical suspension, but is termed *wet steam,* or *saturated steam,* when a part of the water is held suspended mechanically. In the latter case it is produced under low pressure, or is affected by a low temperature, as the visible cloud of steam passing from a vessel, which is composed of minute drops of water produced by the condensation of the steam as it issues into the colder air. Water changes into aqueous vapor by surface evaporation at all temperatures, but the term steam is not properly

applied to other than the vapor resulting from boiling. The boiling point of water depends on the pressure upon the surface, the purity of the water, and the nature of the vessel, but at ordinary atmospheric pressure it boils in an open vessel at a temperature of 212°. If the pressure on the surface be increased, the boiling point is raised correspondingly. Pure water boils at a lower heat than when containing a considerable per cent. of salt.

The temperature of steam is the same as that of boiling water; the heat supplied simply suffices to convert the water into gaseous steam without raising the temperature of the steam, and as soon as the temperature is slightly lowered a part of the so-called *dry steam,* or *pure steam,* is condensed and forms wet steam. When boiling begins, the water remains at the same temperature, all the heat applied acting to change water into steam. This is ordinarily expressed by saying that the heat becomes latent in steam, and, the greater the latent heat, the more is manifested its elasticity or power of pressure. Thus heat is the power in steam which enables it to do work. If the water is boiled in a closed vessel the steam accumulates and both pressure and temperature increase, but the pressure increases more rapidly than the temperature. In the process of highly heating steam, its temperature rises until it acts like a perfect gas, when it is said to be *superheated steam.* The most important uses of steam include its service as an agent for the production of mechanical force in manufactories, steamboats, and railway engines. It is employed extensively in brewing, distilling, warming buildings, heating baths, and for cooking purposes.

STEAMBOAT, a vessel propelled by the agency of steam, which agent acts either on a

THE CLERMONT.

screw or on paddles. Inventors began to give attention to improvements in navigation as soon as machines were constructed to successfully employ steam as a propelling agency. Little success crowned the efforts until 1736, when some progress was made by Jonathan Hulls in constructing a towboat to be moved by a steam engine setting a paddle wheel in motion. The idea had been suggested by wheel boats propelled by oxen or horses, which were used to some extent as early as the time of the Romans, but the application of steam at that time did not prove entirely successful. John Fitch and James Rumsey, two Americans, constructed vessels to be driven by steam in 1786. The paddle boat launched by Fitch moved at the rate of four miles an hour, but the one constructed by Rumsey was propelled by a stream of water issuing from the stern and did not prove successful. Extensive experiments were made about the same time in England and France, but the first really practical steamboat and the one that marks the epoch of steam navigation was built by Robert Fulton and Robert R. Livingston in 1807.

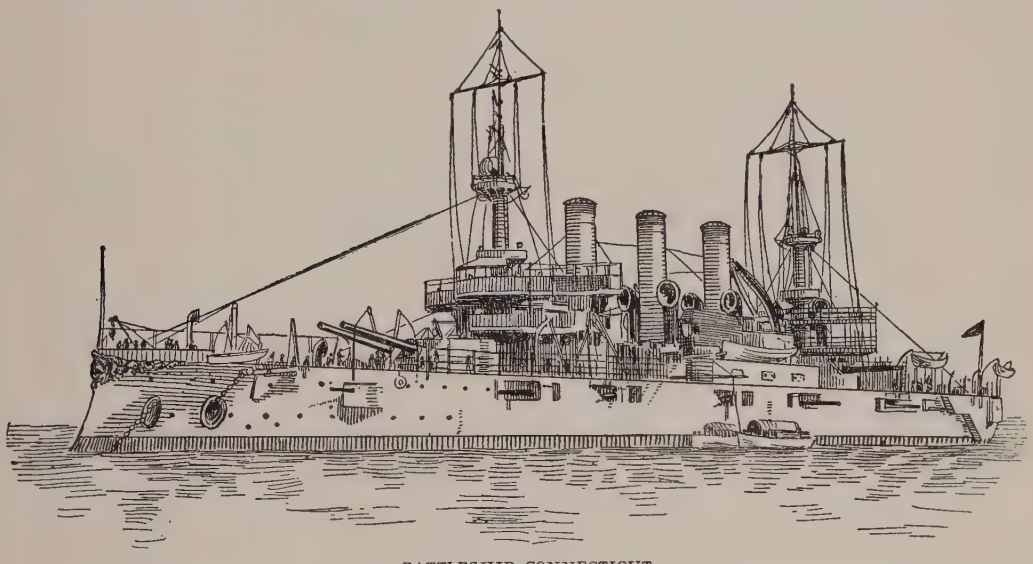
Fulton had seen a vessel named the *Charlotte Dundas,* a steamboat with one paddle wheel near the stern, constructed in England in 1801, and from it he patterned in building the *Clermont,* which was launched in 1807 and served for regular trips on the Hudson between New York and Albany. The *Clermont* was 130 feet long and had a speed of five miles an hour. Fulton and Livingston established a yard for building steamboats at Pittsburg in 1811, at which a number of vessels were completed for river service and later several were built for use on the Great Lakes. The first steamboat passed from Glasgow to London in 1815 and from New York to New Orleans in 1818. The first steam vessel to be used in the British navy was called the *Comet,* which was launched at Woolwich in 1822. In 1838 the first two steamboats crossed the Atlantic, the *Sirius* sailing from Cork and the *Great Western* from Bristol, both vessels reaching New York on April 23. The *Sirius* made the trip in nineteen days and the *Great Western* in fifteen, their arrival at the port of New York being watched by a large crowd of eager spectators. These vessels were of the paddle-steamer type, a form of construction used almost exclusively at first. The largest vessel of this type was the *Scotia,* launched by the Cunard line in 1861, which crossed the Atlantic in nine days. Its length was 366 feet; breadth, 48 feet; and the stroke of the engines, 12 feet. The Cunard line established regular communication between Liverpool and New York in 1840, being the earliest to make such connections, and soon after began to make regular trips between other important ports.

Captain Ericsson, in 1837, successfully applied the screw propeller, an apparatus made in modification of the common screw, which is driven by steam to propel ships through the water. It is constructed of spiral plates or distinct blades attached to a central shaft or cylinder

and is placed immediately before the stern post, at the bottom of the ship. The ships are given an onward motion because of the propeller being driven rapidly in the water by the steam engines. It soon became apparent that the screw propellers possess many decided advantages over either rear end or side paddle wheels, and consequently came rapidly into general use.

A decided advantage has been obtained in the use of iron and steel instead of wood for the construction of sailing vessels and consequently ocean navigation has become much more efficient and rapid. Formerly from twelve to fifteen days were required to cross the Atlantic, but now first-class vessels make the passage in five or six days. The *Leviathan,* a vessel of the United States Lines, may be taken as a type of modern vessels constructed of steel, and is one of many excellent steamers sailing between American and European ports. It is 950 feet long, 56 feet deep, and 100 feet wide. This great vessel has a tonnage of 59,956. However, it is exceeded in speed by some vessels. Up to 1914 the best record in sailing from Europe to America was made by the *Deutschland* (Germany), which sailed from Cherbourg, France, to Sandy Hook, N. Y., a distance of 3,045 miles, in five days seven hours and twenty-eight minutes. The trip from Queenstown, Ireland, which is shorter than that from Cherbourg, has been made in five days seven hours and twenty-three minutes. This is the record made in 1908 by the *Lucania.* However, such vessels as the English *Mauretania* are much larger and have a higher speed. The *West Virginia,* which has a displacement of 32,600 tons and a speed of 21 knots, is a type of the American battleships which are now in service.

Vessels for navigating interior waters, such as rivers, canals, and lakes, are of smaller construction than those employed for service on the ocean. The depth and character of the water to be navigated determine in a large measure the construction. The smaller boats are fitted to use six feet draught of water successfully and usually are stern wheelers, but the larger steamboats of interior waterways have kept pace reasonably well in speed and equipment with the ocean liners. The latter have a speed ranging from 525 to 565 knots in 24 hours, while the best steamships for interior waterways have a speed of from 425 to 500 knots, though the smaller vessels range much lower. Screw propellers are employed extensively on the Great Lakes and the deep rivers, but many vessels propelled by paddles are in use for freighting and for towing barges and other vessels. Steamboats used for passenger service are structures of very large dimensions and much beauty, being supplied with fine parlors, steam heat, and electric lights. See **Ship.**

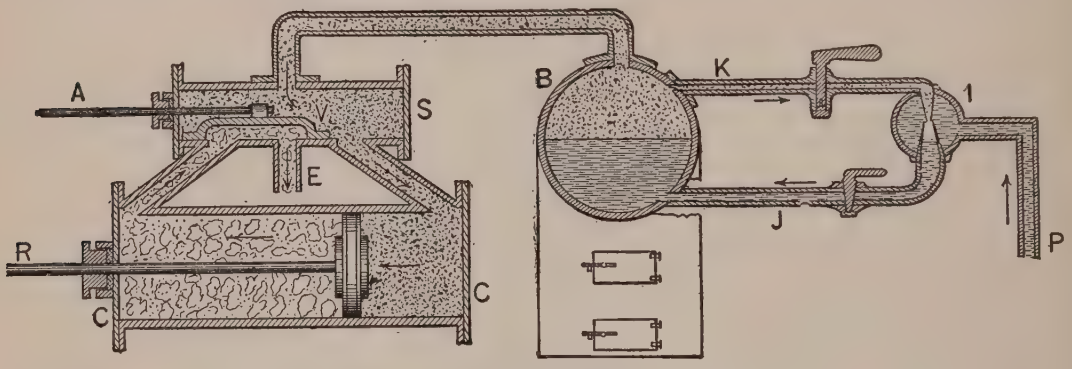


BATTLESHIP CONNECTICUT.

STEAM ENGINE, a machine for utilizing the elastic force of steam as a motive power now constructed in a variety of forms. The power of heat to do work when combined with other elements in the form of steam was known to some extent to the ancients, though its extensive use is entirely modern. Hero of Alexandria, about 150 B. C., described the earliest steam engine, which was exhibited in the Serapeum at Athens. It was called the *aeopipile* and consisted of a boiler for generating steam, from which extended two pipes to a sphere made to rotate by the inflowing current of steam. Nothing of material interest resulted during the succeeding centuries until Baptista Porta, the inventor of a camera-obscura, in 1606, published a pamphlet in regard to the

writings of Hero and mentioned a lifting pump that served to raise water by steam pressure. The Marquis of Worcester, in 1665, described a steam engine in his "Century of Inventions," but this was followed by no practical results, and in 1698 Captain Savery constructed an engine to raise water.

Considerable progress was made by German and French inventors in constructing various devices, but James Watt is the accredited inventor of the modern steam engine, applying its principles in 1763. While observing the action of steam originating from boiling water in a teakettle, which caused the lid to rise and fall alternately, he received suggestions that led to the invention of a mechanical structure for condensing the steam in a separate vessel some distance from the cylinder. He patented a single-acting steam engine in 1769 and in 1782 obtained a patent for a double-acting steam engine, but previous to that had already introduced a method of allowing the steam to work expansively. Since then many improvements have been wrought in the construction of steam engines and their uses are very numerous in all phases of industrial and commercial enterprises. They vary in size from the small toy engine, used by the child in play, to the large and skillfully constructed machines employed in large factories, in locomotives, and in ocean steamers.



STEAM ENGINE.

A slide valve rod· *B* boiler; *C. C*, cylinder; *E*, exhaust; *I*, hot well; *J*, pipe to admit water to the boiler; *K*, pipe to supply steam to the hot well; *P*, pipe from the pump; *R*, piston rod; *S*, steam chest; *V*, slide valve.

The boiler (see [B] in the figure) to generate the steam, though usually considered a separate device, is an essential mechanism in the use of a steam engine. A pump forces the water through the pipe (P) into the tank (I), called the *hot well*, where it is warmed by means of steam admitted through the pipe (K). The water required in the boiler is taken from the hot well through the pipe (J) by an injector or a force pump. From the boiler the steam passes through a pipe, as shown in the figure, leading to the enclosure (S), called the *steam chest*, which is so constructed that the steam cannot pass from it except by openings made for that purpose. In the simple form of the engine there are two of these openings, called *ports*, one at the front and the other at the back of the cylinder (C, C). A large opening called the *exhaust* (E) is situated between the two ports, through which the steam may escape from that side of the piston from which the steam has been cut off. The rod (A) works a contrivance (V), called the *slide valve*, which moves over the portholes and exhaust in such a manner that the steam is admitted to different slides of the piston, as it moves backward and forward in the cylinder, and opens the exhaust to allow the dead steam to escape. The alternating motion of the piston rod (R) is converted into a steady rotary motion by means of a crank and thus produces a continuous rotary motion of a wheel attached to the moving shaft; in this way continuous motion of the machinery is secured.

The two classes of steam engines are called high-pressure and low-pressure. In the *high-pressure engine* the steam, after it has done its work, is forced out into the air through the exhaust. The puffs of steam which escape from such engines denote the speed of the piston being driven backward and forward. In the *low-pressure engine* the dead steam is condensed in a separate chamber by a spray of water, thus lowering the pressure on that side of the piston from which the steam has been cut off. A pump, called the *air pump*, removes the water from the condenser. The slide valve in both forms of engines is operated by means of a bent lever moved by an eccentric rod. An apparatus called the *governor* (q. v.) regulates to some extent the supply of steam required by the engine. The dead points of the engine are at the farthest part of the stroke of the piston, when the slide valve is arched over the exhaust and closes both ports. If the engineer opens the throttle valve, live steam fills the steam chest, but it cannot enter the cylinder unless the fly wheel of the engine be moved until the back port becomes opened. When the

engine is in motion the fly wheel by its inertia continues to move and carries the crank past these points.

A locomotive is a self-propelling steam engine which travels on wheels and is used for various purposes, but mostly on railroads. The first steam carriage was patented by James Watt, in 1784, and numerous patents have been taken out in different countries, but carriages propelled on the common roads have thus far been impracticable. This is due largely to the fact that they are too expensive for individual use and because few highways are fitted for conveyances of that kind. The oldest locomotive now in existence is called *Puffing Billy* and is in the Patent Museum at South Kensington, England. It was constructed in 1813 for service on a railway track and was used for some time in freighting and carrying passengers. Stephenson, in 1814, built the first locomotive resembling those in practical service. His engine, called the *Rocket,* had two cylinders, one on each side of the engine, and the whole locomotive weighed a little less than five tons. The boilers of modern locomotives are tubular in form, and the engine is driven by two and sometimes by four cylinders. Waste steam from the cylinders is discharged through a pipe to the chimney of the engine and is utilized to create the draught for the boiler. The steam from the cylinders acts on cranks on the axle of the driving wheels, which are four to nine feet in diameter.

Locomotives have six, eight, and in some cases twelve wheels, two, four, or six driving wheels being coupled together. They usually weigh 50 to 60 tons, but sometimes even more than 250 tons, and the speed ranges from 30 to 75 miles an hour. The capacity ranges from 4,500 to 6,000 horse power. A tender or car is attached to provide a supply of water and fuel. It is estimated that a ton of bituminous coal is consumed on level roads every twenty miles, and about two pints of oil are used to lubricate the machinery. The life of an engine is about thirty years, and the cost of construction ranges from $15,000 to $45,000. One of the largest engines ever built was completed in 1914 at Pittsburgh, Pa., for service in hauling long and heavily loaded freight trains. The total weight is 853,000 pounds; the boiler capacity, 7,500 gallons; the steam pressure, 220 pounds; and the heating surface, 3,564 square feet. Traction engines are used extensively in propelling thrashing machines. They serve to drive the machines and to move them from place to place.

STEAM HAMMER, a powerful machine hammer, employed in making large iron and steel forgings. It was invented by James Nasmyth (1808-1890) of Edinburgh, in 1838, and was patented four years later. A form of the steam hammer had been used in France for some time, from which the inventor secured a number of suggestions, but added several new and valuable improvements. The hammer is raised by steam to the required height, the propelling force acting against a piston, and when the steam is cut off the exhaust valve opens, thus permitting the hammer to descend. The height of the fall and the force of the blow can be regulated at will. In an improved form the hammer moves to the required height between the guides and effects a downward blow in such manner that the steam and the weight of the moving parts act together in one direction, though in most of the machine hammers the steam is used only to raise the hammer, which is allowed to fall by its own weight. Steam hammers of an enormous size are not uncommon, frequently weighing 100 to 125 tons. The largest ever made was completed in 1888 by the Krupp works at Essen, Germany, and weighs 150 tons. In some of the factories using vast machinery for steel and iron forging, steam hammers propelled by hydraulic or pneumatic power have been introduced. Machine hammers are constructed with a view of regulating the force applied, being capable of doing the heaviest forging or the most delicate work.

STEAM SHOVEL, a machine for excavating material on dry land, being a modified form of the steam dredge. The steam shovel came into extensive use about 1865 and is employed largely for excavating in railway construction. It consists essentially of a steam hoisting engine and a movable crane, both being mounted on wheels fitted to run on a track. The crane is attached by a hinge at the lower end to the frame and carries a scoop or shovel. When the scoop is lowered to the place where an excavation is being made, it is thrust into the earth by a mechanism, which causes it to be filled with earth. It is then raised by the crane and swung so as to carry the load over a car, when the latch is pulled by means of a cord, thus opening the swing bottom of the scoop and permitting the contents to fall into the car or upon the place where they are wanted. In most cases the earth is loaded in cars and transported to a locality where a heavy grade is built, but sometimes the excavated earth is merely thrown out to the side and the railway track is afterward laid in the cut. Steam shovels are used to some extent for cutting drainage and irrigation canals. In the Lake Superior region a large number are employed for digging ore and loading it upon cars for transportation to the smelter. Where the earth to be excavated is firm or rocky, the scoop has strong steel teeth at the edge or lip.

STEAM TURBINE, a machine in which the kinetic energy of expanding steam is used to cause rotation, the force acting upon a wheel provided with vanes. In the steam engine the steam is admitted into a closed cylinder, where it produces motion by acting upon a movable

piston, while in the steam turbine the expansive force of particles of steam, through the property of expansion, have an effect similar to that of water on the turbine wheel. Several styles of steam turbines are in use, some having a series of turbine wheels on one shaft. The steam transmits to each turbine wheel a rotary impulse, partly by reaction and partly by direct impulse, but the wheels vary somewhat in the size of the diameter, succeeding ones being slightly larger to adapt them to the pressure as the steam expands. Steam turbines are high in speed and a train of gearing is used to reduce the speed to a suitable velocity for working purposes. They are used chiefly on steamships, since they cause less strain and greater uniformity in the rate of speed. While machines of this kind were used at a comparatively early date, the first steamer propelled by steam turbines did not cross the Atlantic until in 1905.

STEAM WHISTLE, an apparatus for producing a loud whistling sound through the agency of steam. It is attached to a steam boiler, as in a locomotive, and the sound is produced by a rapid discharge of the steam, which issues from a narrow annular orifice around the upper edge of a cup or hemisphere, then striking the thin edge of a bell above it. The sound is produced in the manner of a common whistle or an organ pipe. The steam is shut off by a stopcock, to which a cord or wire is attached for the purpose of opening the stopcock and thus permitting the steam to rush through the opening when a signal is to be given. An instrument known as the *calliope* has a number of steam whistles suitable to produce musical tones, the length of the pipe or cup giving variations to the sound produced.

STEARIC ACID (stē-ăr'ĭk), a product obtained from mutton suet and other fats that contain stearin. It is inodorous and tasteless, combines with numerous bases, and with the latter forms acid and neutral salts called *stearates.* It is insoluble in water, but is soluble in alcohol. In fats it exists in combination with glycerin. It is used in making candles.

STEARIN (stē'ā-rĭn), the principal constituent of fats, obtained from fats by saponification; that is, by decomposition through the agencies of alkalies. It is less soluble than olein and palnitin, the other constituents of natural fats. In ether and alcohol it is soluble, but is insoluble in water. The chief use is in making soap and glycerin.

STEDMAN, Edmund Clarence, poet and critic, born in Hartford, Conn., Oct. 8, 1833; died Jan. 18, 1908. After studying at Yale University, he engaged in journalism, serving as editor of the Norwich *Tribune* and later of the Winsted *Herald.* In 1854 he settled in New York City to engage as a contributor to periodicals, but soon became an editorial writer for the New York *Tribune.* He was field correspondent for the New York *Herald* in the Civil War and in 1864 engaged in banking in New York City. The first volume of poetry from his pen was published in 1875 under the title of "Victorian Poets," which went through a large number of editions, and by them and others the author earned a high place as a critic and writer of verse. He is counted one of the foremost American poets of the early part of the 20th century and is eminent as a critic of poetry. His chief writings include "Library of American Literature," "Nature and Elements of Poetry," "Hawthorne and Other Poems," "Poets of America," "Victorian Poets," and "Lyrics and Idyls." Yale conferred the degree of master of arts on him, in 1871, and subsequently he was honored in the same way by Dartmouth.

STEEL, a compound or alloy of iron. It contains a greater or less per cent. of carbon, and in this respect ranges between wrought iron and cast iron. Wrought iron has only a small quantity of carbon and cast iron sometimes as much as 10 per cent., while ordinary steel possesses from 1 to 2 per cent. The value of steel depends principally upon its durability and the ease with which it can be hardened or softened. The operation in which the change in hardness is brought about constitutes the process of tempering. It becomes soft and malleable like soft iron when heated and allowed to cool slowly, but, if heated to redness and plunged suddenly into cold water, it is rendered exceedingly hard. The degree of hardness can be easily regulated by the intensity of the heat applied and by the suddenness of plunging it into cold water. Steel can be welded almost as easily as iron when in a red-hot condition and melts at a lower temperature than soft iron. The color is a bright grayish-white and it is denser, finer, smoother, and more elastic than iron. It takes a brighter polish than iron, rusts less easily, and has a granular texture.

Grades of Steel. Various names are applied to the different grades of steel, depending on the process it has undergone in manufacture. *German steel,* or *natural steel,* is a grade obtained from the ore or from the cast iron. *Blister steel,* or *cement steel,* is made by piling soft iron bars between layers of charcoal in fire-clay boxes, which are then heated to redness in a furnace, and the temperature is maintained for several days. In this process the iron absorbs a certain portion of carbon and is converted into steel. *Cast steel* is produced by melting cement steel. This grade is imperfect, owing to the carbon uniting in unequal quantities with the iron. In the process of making cast steel a crucible is employed and in the ordinary method a powerful wind-furnace blast is applied. *Shear steel* is obtained from cement steel, the latter being rolled or beaten into bars. Steel obtained from cast iron in the refining house is called *furnace steel,* and the grade that

has undergone only one application of the refining process is designated *rough steel.*

The most important method of manufacturing steel is named the *Bessemer process* from its inventor, Henry Bessemer. It is a cheaper and better method than was known previously and has greatly reduced the price of steel. Besides, it has been the cause of a much freer use of steel in all the more important products of the manufactories. It consists in completely decarbonizing cast iron and then adding a sufficient quantity of cast iron of the proper quality to give the whole mixture the desired amount of carbon. This is done by melting the cast iron in a furnace and then drawing the molten mass off into a large covered crucible. A blast of air is forced into the melted metal, which operates to raise the heat sufficiently to burn out the carbon. A quantity of cast iron very rich in carbon, called by the Germans *spiegeleisen* (mirror-iron), is added when the molten mass has become decarbonized and the blast is continued for a short time. This operates to remove the remaining impurities and gives the steel its proper consistency, after which it is drawn from the crucible or converter into the casting mold. Various other processes of manufacturing different grades of steel are employed with success, all of which are more or less important in obtaining the desired classes of Bessemer.

Production of Steel. The United States, Germany, and England are the three most extensive producers of steel. The steel production in the United States averages about 44,108,500 tons annually, which is more than the combined product of Germany and England, but the steel output of the latter country exceeds that of France. In 1927 Germany produced 16,090,000 tons of steel; Great Britain, 9,468,250 tons; France, 8,325,260 tons; and Canada, 800,000 tons. Steel is used extensively for shafting, tubes, boiler plates, ship plates, nails, rivets, tin plate, firearms, machinery, edged tools, and scientific instruments. Within recent years it has gone into use largely for construction purposes, especially in erecting bridges, elevators, and tall buildings in cities.

STEEL, Sir John, sculptor, born at Aberdeen, Scotland, 1804; died Sept. 15, 1891. He studied at Edinburgh and later at Rome, and gained a prize for the seated statue of Sir Walter Scott, which forms part of the monuments erected in Edinburgh. In the same city is his colossal statue of Queen Victoria. In 1850 he completed the bronze equestrian statue of the Duke of Wellington, also in Edinburgh. Two of his statues are in New York City, one of Robert Burns and one of Sir Walter Scott. His works include the memorial statue of Prince Albert, unveiled in 1876.

STEELE, Sir Richard, eminent author, born in Dublin, Ireland, in 1672; died at Carmarthen, Wales, Sept. 1, 1729. His father was an attorney in the city of Dublin, where the son attended school and afterward studied at the Charter House and at Oxford. In the two latter institutions he was largely influenced by Addison, who was his personal friend and aided him materially. He enlisted in the military service in 1694, rising to the rank of captain by 1702. Shortly before he had published a work entitled "Christian Hero," in which he endeavored to show that religious principles are essential in reforming customs and manners, but its strictness brought ridicule on the author, since he was by no means strict in his own personal conduct. Queen Anne gave him a court appointment in 1706, and this, together with his marriage to a wealthy lady named Mary Scurlock, gave him an adequate income. However, he was extravagant and a man of many wants and consequently quite often felt financial straits. Addison assisted him to secure the appointment as editor of the *Gazette,* in 1707, and two years later he began the publication of a triweekly known as the *Tatler,* in which he published short essays and town gossip. In 1710 he began the publication of the *Spectator,* a literary journal issued daily, and in 1713 began issuing the *Guardian.*

The literary fame of Steele rests largely on the essays contributed to the *Tatler, Spectator,* and *Guardian,* in which he published respectively 188, 240, and 82 contributions of merit. Though himself a ready and pleasant writer, he was assisted by contributions from Addison, Swift, Berkeley, and others, all of whom wrote for his publications. When the Tories came into power, in 1710, he lost the office of gazetteer in the House of Commons, which he held for four years, largely because of publishing articles in *The Crisis* that were considered treasonable. He secured his position again on the return of the Whigs to power shortly after the death of Queen Anne, was elected to Parliament for Boroughbridge, and George I. knighted him. Among his writings not named above are "The Conscious Lovers," his best comedy, and journals entitled "Town Talk," "The Plebeian," "The Reader," "The Englishman," "The Tea-Table," and "Chit-Chat."

STEEL ENGRAVING, the art of engraving on steel plates for the purpose of reproducing prints or impressions in ink upon paper and other substances. Work of great delicacy can be executed on steel, both by etching and by cutting with the graver, and the printing obtained from a plate of this kind possesses superiority in brilliancy and exactness. The art of steel engraving is comparatively modern and originated with those designing to overcome forgery and imitation of bank notes and government securities. It is employed largely by the government in engraving securities and bank notes. In the fine arts it is used for reproducing the works of master painters. See **Engraving.**

STEELTON (stēl'tŭn), a borough of Pennsylvania, in Dauphin County, three miles southeast of Harrisburg, on the Susquehanna River. It is on the Pennsylvania and the Philadelphia and Reading railroads. The surrounding country produces fruits, cereals, and coal. It is the seat of extensive manufacturing establishments, among them rail mills, blast furnaces, planing mills, bridge construction works, shirt factories, and machine shops. Electric and gas lighting, waterworks, sanitary sewerage, and electric street railways are among the improvements. It was settled in 1865 and incorporated in 1880. Population, 1900, 12,086; in 1921, 13,428.

STEELYARD (stēl'yärd), an apparatus for weighing, so called from the Steelyard, a place in London where steel was sold. The body to be weighed is suspended by the shorter arm of a lever, which turns on a fulcrum, and a weight is caused to slide upon the longer arm to produce equilibrium, its place upon this arm indicating the weight. The upper edge of the longer arm is notched to a graduated scale.

STEEN (stān), **Jan,** painter, born at Leyden, Holland, in 1626; died Feb. 3, 1679. He studied art at Utrecht and afterward at The Hague and in 1646 settled at Leyden. His productions are very numerous and have had a marked influence upon art in the Netherlands. Many galleries of Europe have specimens that show a close acquaintance with nature, some of them giving evidence of dramatic feeling. Among the most important are "The Music Lesson," in London; "The Marriage Contract," Brunswick; "The Menagerie," The Hague; "The Painter's Family," Amsterdam; and "Dissolute Company," Berlin.

STEIN (stīn), **Heinrich Friedrich Carl, Baron von,** statesman and author, born in Nassau, Germany, Oct. 26, 1757; died in Westphalia, June 29, 1831. After studying in the public schools, he entered the University of Göttingen and in 1778 enlisted in the Prussian military service. He was made director of the department of mines for Westphalia in 1784, and several years later visited the mining regions of various parts of Europe with the view of introducing more modern methods in the district under his supervision. In 1797 he was made president of the Westphalian chambers and in 1804 became minister of imposts, taxes, and manufactures for Prussia. In that capacity he brought about many reforms, among them the merit system in civil service, the abolition of serfdom, better systems of city government, and an extension of government interest in constructing public works. The rapidity with which Napoleon rose in power brought Stein in opposition to the development of French interests, and he was compelled to resign in 1808 and retire to Austria. Napoleon confiscated his property, but Stein proceeded to Russia in 1812, where he aided Emperor Alexander in planning for the final overthrow of Napoleon. When the allied army marched into Saxony, he became president of the council of the German Confederation and continued an important factor until after the overthrow of Napoleon, when he retired from public service. His writings include "Political Testament," "Monuments of German History," and numerous official and historical documents of Germany. In Nassau and Berlin are monuments erected to his memory.

STEINBOCK (stīn'bŏk), a small antelope native to South Africa. It has a reddish color, a long neck, and slightly curved horns. At the shoulder it measures about 24 inches. The flesh is highly nutritious, for which it is hunted by natives and Europeans. It is found chiefly in thinly wooded and hilly places. The ibex of Europe is commonly called steinbock among the Germans.

STELVIO (stĕl'vē-ō), **Pass of,** a celebrated carriage road in Europe. It is located across the Tyrol Alps between Italy and Austria, and forms a part of the highway between Innsbruck and Milan. This roadway was completed in 1828 under franchise by the Austrian government, and is still noted for its fine construction and the beautiful scenery of the region which it traverses. It passes over heights 9,076 feet above the sea and is 33 miles long.

STEM. See **Plants.**

STENCIL (stĕn'sĭl), a pattern for printing letters and ornamental designs, usually made of thin brass or cardboard. The stencil contains the designs to be produced, these being cut by machinery, and in marking it is laid on the surface which is to receive the design. The paint is applied by means of a brush after the stencil has been properly adjusted, and in this way it is possible to produce ornamental work very rapidly. Rubber stamps are now used largely for lettering, though previously stencils were employed for that purpose, and the latter are used where the designs are larger than can be produced by stamping.

STENOGRAPHY (stē-nŏg'rà-fy). See **Shorthand.**

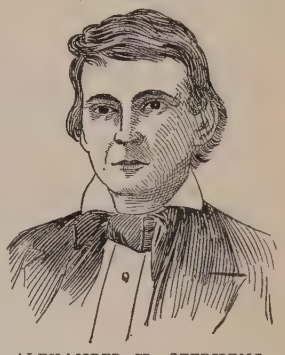
STEPHEN (stē'vęn), King of England, born at Blois, France, in 1105; died Oct. 25, 1154. He was the second son of Stephen, Earl of Blois, and Adela, daughter of William the Conqueror, and nephew of Henry I. of England. As Stephen was a titled nobleman of Normandy, he received large estates in England. He took the oath to aid in the succession of the daughter of Henry I., Empress Matilda, to the throne of England, but on the death of his uncle, in 1135, he claimed the throne. At that time he hastened to Britain and was crowned on Dec. 23, 1135, but Matilda landed in England in 1139 and with the support of her half-brother, the Earl of Gloucester, she conducted a successful civil war. Stephen was made a prisoner in 1141 and Matilda was proclaimed queen, but an insurrection soon arose

against her government, which terminated in her being made a prisoner at Winchester Castle. The Earl of Gloucester was imprisoned and soon after was exchanged for Stephen, thus supplying the conditions that continued the war. Matilda having escaped from imprisonment, she retired in 1147 to Normandy, and the war was prolonged in her behalf by her son Henry. The Treaty of Wallingford brought the struggle to an end, in 1153, the agreement being that Stephen should remain king until his death, when Henry should succeed to the throne, which he did on Oct. 25, 1154, as Henry II. By this agreement the Anglo-Norman line ended, and the throne passed to the Plantagenet dynasty.

STEPHEN, the name of ten popes of Rome, who reigned within the period between 253 and 1058. See **Pope.**

STEPHEN, Sir Leslie, critic and author, born in London, England, Nov. 28, 1832; died Feb. 22, 1904. He was educated at Eton and King's College, London, and Trinity Hall, Cambridge, graduating from the last mentioned institution in 1854. Shortly after graduation he was made a fellow at Trinity Hall, where he remained until 1864, when he removed to London to engage in literary work. In 1865 he published a work entitled "Sketches from Cambridge," which had formerly been printed in the *Pall Mall Gazette,* and in 1871 he became editor of the *Cornhill Magazine.* After serving efficiently about ten years as editor of that periodical, he resigned in 1892 to become editor in chief of the *Dictionary of National Biography,* for which he wrote about 400 articles, including the biographies of Hume, Burns, Scott, Addison, Byron, Pope, Swift, Gibbon, Thackeray, Fielding, and Wordsworth. He held the Clark lectureship of English literature at Cambridge in 1893. His first wife, Harriet Marian, who died in 1875, was the younger daughter of William M. Thackeray. Edward VII. knighted him in 1902. His principal publications include "Essays on Free Thinking and Plain Speaking," "Hours in a Library," "Science of Ethics," "History of English Thought in the Eighteenth Century," "Life of Sir James Fitzjames Stephen," "Studies of a Biographer," "Life of Henry Fawcett," "Social Rights and Duties," and "English Utilitarians."

STEPHENS (stē'vĕnz), **Alexander Hamilton,** statesman, born near Crawfordville, Ga., Feb. 11, 1812; died March 4, 1883. After attending the common schools, he studied law and was admitted to the Georgia bar in 1834. He practiced law successfully, was elected to the Georgia Legislature in 1836, and from 1843 to 1859 served as a Whig in the United States Congress. He supported Douglas in his slavery policy and in 1860 strongly opposed secession, delivering at several times important speeches in favor of the union. However, when his State seceded, he embraced the policy of the Confederate States and served as Vice President from 1861 to 1865. He was one of the leading statesmen of the Confederacy and in 1865 was imprisoned for five months at Fort Warren in Boston Harbor. Shortly after his release he was elected a United States Senator from Georgia, but was refused a seat because his State had not complied with the conditions of reconstruction. In 1875 he became a member of the House of Representatives, in which he served until 1882, when he was elected Governor of the State of Georgia. He published a valuable work in two volumes, entitled "Constitutional View of the War Between the States."



ALEXANDER H. STEPHENS.

STEPHENS, John Lloyd, author and traveler, born in Shrewsbury, N. J., Nov. 28, 1805; died in New York City, Oct. 10, 1852. In 1822 he graduated from Columbia College and soon after established a successful law practice in New York City. Failing health caused him to undertake an extensive trip to Europe, in 1834, and before returning to America he traveled through Egypt and Asia Minor. The accounts of his travels were made public in book form in 1837, under the title "Incidents of Travel in Egypt and the Holy Land," and the following year he published "Incidents of Travel in Greece, Turkey, and Russia." He was commissioned by the United States government, in 1839, to negotiate a treaty with the governments of Central America, and soon after published "Incidents of Travel in Central America, Chiapas, and Yucatan." In 1841 he made a second tour of Yucatan in company with Frederick Catherwood, and subsequently became associated with the enterprise of building a railroad line across the Isthmus of Panama. His latest published work is based on his second tour in Yucatan, entitled "Incidents of Travel in Yucatan," in which he made a valuable statement of facts regarding the monuments and other antiquities of that region. He superintended the Panama railroad construction work from 1849 until his death.

STEPHENSON (stē'vẹn-sŭn), **George,** eminent inventor, born near Newcastle, England, June 9, 1781; died Aug. 12, 1848. He descended from parents in very moderate circumstances, and was first employed to herd cows at four cents a day. Subsequently he worked in gardens at eight cents a day. In 1796 he was employed to tend a colliery engine at a salary of $3 per week, and while serving in that capacity he studied the elementary branches of learning at odd times in the engine room. After making some progress in these studies, he turned his

attention to an investigation of the machinery with which he was associated, and when twenty years of age secured the situation of brakeman. Close application to the duties caused his promotion to the position of engine-wright at Killingworth in 1812, where he received a salary of $500 a year. While there he was given permission by Lord Ravensworth to construct a traveling engine for the tramroads between the colliery and the port, nine miles distant. He successfully completed a locomotive in 1814 and named it *My Lord.*

GEORGE STEPHENSON.

This invention proved so successful that he was able to induce the projectors of a railway between Stockton and Darlington, who had designed to use horses for propelling their wagons, to adopt his locomotive and he was made engineer. The success of the enterprise caused his employment in the construction of a railway between Liverpool and Manchester, receiving for his services a salary of $5,000 a year. A locomotive made by him and his son Robert, called the *Rocket,* was accepted by the company, and on a trial trip in 1830 developed a speed of 29 miles an hour. Thus, Stephenson became the originator of the railway to carry freight and passengers, and soon after his first successes railroads began to develop in all parts of the civilized world. He made a visit to Belgium and Spain in 1845 and was attacked by pleurisy, from which he never fully recovered. His last years were spent on his country seat at Tapton, where he utilized his wealth by causing the planting of gardens and orchards, and enjoying the quiet and beauty of his home.

STEPHENSON, Robert, eminent engineer, born at Willington Quay, near Newcastle-upon-Tyne, England, Oct. 16, 1803; died Oct. 12, 1859. He was the only son of George Stephenson. After attending school in Newcastle he secured an education at the University of Edinburgh. In 1823 he assisted his father in surveying the first railway built from Stockton to Darlington and in 1824 went to Mariquita, South America, to spend three years under an engineering appointment. After returning to England by way of Canada and the United States, he aided in building the *Rocket* at his father's locomotive works, and subsequently became managing engineer of the London and Birmingham Railway. Among the enterprises projected by him are the bridge across the Saint Lawrence at Montreal, two bridges across the Nile at Damietta, and the Britannia tubular bridge. He was made a member of Parliament in 1847, received the cross of the Legion of Honor from France in 1855, and shortly after was given a degree by the University of Oxford. His remains were buried with elaborate ceremony in Westminster Abbey. He published "Report on the Atmospheric Railway System" and "Description of the Locomotive Steam Engine System."

STEPNIAK, Sergius Michael Dragomanoff, eminent revolutionist and author, born in Ukraine, Russia, in 1841; died in London, England, Dec. 23, 1895. The name by which he is known is his pseudonym, his real name being Kravthehinski. He descended from a Cossack family, studied at Kieff, and was made an instructor of history in the University of Kieff in 1865. Subsequently he became politically offensive to the government for advocating greater liberty. He was removed as instructor from the university in 1873 and three years later fled to Switzerland. In 1885 he found refuge in London, where he devoted much of his time to literary work. His principal publications include "Underground Russia," "Internal and External Turkey," "The Career of a Nihilist," "Russia Under the Czars," and "Russian Internationalism."

STEPPES (stĕps), the name applied by the Russians to the plains occupying a part of Siberia, stretching across Southeastern Europe as far west as the Dnieper. These plains have a generally undulating surface with occasional ranges of low hills, and are mostly treeless and quite barren. In many places fertile regions of greater or less extent abound. Nutritious grasses cover most of the surface in the spring, but during the dry season of summer and fall the greater part is extremely arid and barren. A large part of this region is occupied by nomadic Tartars.

STEREOSCOPE (stĕ'rĕ-ō-skōp), an instrument whose purpose is to aid in attaining vision of a pair of properly prepared pictures, which together compose the stereograph. The first form of this instrument was invented by Sir Charles Wheatstone in 1838, but subsequently many improvements were made, and there are at present several forms of it in extensive use. The common stereoscope has a double lens, or a pair of half-lenses, set in a small box, and through these the eyes of the observer look upon two pictures stationed at the proper focus some distance from the box. Photographs taken for use in instruments of this kind are from two aspects, one as seen with the right eye and the other as seen with the left, and they are placed in a transposed position on a cardboard fitted to be held in a frame. When brought into focus, the instrument makes the two images blend into one, and they appear to the observer as only

one image, which, however, is greatly intensified.

STEREOTYPE (stĕ'rĕ-ō-tīp), the name commonly applied to a plate made from a plaster or papier-maché mold, which is used in printing instead of movable type. Johann Müller, a German pastor in Holland, is credited with the distinction of having successfully produced the first solid plate for use in the printing press, which he did by setting the type and afterward applying a mechanical composition to form a solid mass. This process was utilized to a considerable extent in printing successive editions of various publications, thus economizing greatly in time and the expense usually incurred in setting up movable type with the reissuance of books and pamphlets. William Ged (1690-1749), a goldsmith of Edinburgh, invented a plaster process by which type once set up could be reproduced. He had been employed, in 1731, by the University of Oxford to manufacture plates for Bibles and prayer books, and having seen the utility of Müller's invention, he was instrumental in adding considerable value to the printer's art by originating stereotyping proper. In this process the type is set up in the usual way and the face is oiled with a brush. Plaster of Paris is moistened and made of the proper consistency and poured over the type, and, on being dried, forms a mold corresponding to the face of the type. This mold may be used to secure any number of stereotype plates, thus saving the expense of resetting type for successive editions of books.

Though used to some extent, the Ged method has been almost entirely superseded by an invention of Gerroux, a Frenchman, who in 1829 discovered the papier-maché process. Besides being cheaper, it is much more rapid than any other yet discovered. It is due to this invention that publishers have been enabled to attain the present rapidity of issuing daily newspapers and other periodicals. The type is set in the ordinary way and the form is locked up, after which it is brushed and carefully oiled. Several folds of soft paper are dampened and pasted together, and, after being placed on the type, they are beaten with a stiff brush so as to come in contact with every part of the type-face. A blanket is then spread over the top and it is placed in a steam-heated press, where it is thoroughly dried under pressure, after which the paper matrix is used as a form to cast the stereotype. It is possible to use a paper matrix several times. In newspaper offices using cylinder presses the stereotypes are made in form to fit the cylinder. The art of stereotyping has developed to such a high state of perfection that it is possible to have the stereotypes ready for the printing press in five to eight minutes after the forms are completed.

STERLING (stĕr'lĭng), a city of Illinois, in Whiteside County, on the Rock River, 110 miles west of Chicago. It is on the Chicago and Northwestern and the Chicago, Burlington and Quincy railroads. The Rock River supplies an abundance of water power, thus making it a center for the manufacture of machinery, furniture, paper, gas engines, wire nails, and farming implements. Among the principal buildings are the high school, the public library, the hospital, and many churches. It has well managed systems of waterworks and sanitary sewerage. The surrounding country is agricultural and stock raising. Sterling was platted in 1836 and in 1857 it was incorporated as a city. Population, 1900, 6,309; in 1920, 8,182.

STERNBERG (stĕrn'bĕrg), **George Miller,** surgeon and bacteriologist, born in Otsego County, New York, June 8, 1838. He graduated at the College of Physicians and Surgeons, New York City, in 1860, and the following year was appointed assistant surgeon in the United States army. After serving throughout the Civil War, he was assigned to various posts and in 1875 was promoted to the rank of surgeon and major. He was sent to Havana, Cuba, to study the yellow fever epidemics. During the war with Spain, in 1898, he had command of the medical service. He published "Manual of Bacteriology," "Malaria and Malarial Diseases," and "Immunity and Protective Inoculations." He died Nov. 3, 1915.

STERNBURG, Hermann Speck von, diplomat, born in Leeds, England, Aug. 31, 1852; died Aug. 24, 1908. He studied in Germany, giving special attention to political economy, international law, and military and naval sciences. He served in the German army throughout the Franco-German War, taking part with the Saxon dragoons, and in 1885 became military attaché of the German legation at Washington, D. C. In 1890 he was transferred to be secretary of the legation at Peking, China, and received a similar position on the German embassy at Washington in 1898. During the same year he was high commissioner of the Samoan affair, and in 1903 became minister plenipotentiary and envoy extraordinary at Washington. In the same year he was made ambassador of Germany to the United States. He received many decorations for eminent military and political services, including several from Germany, Austria, and Russia.

STERNE (stĕrn), **Laurence,** humorist and author, born in Clonmel, Ireland, Nov. 24, 1713; died March 18, 1768. He was the son of an English officer stationed in Ireland. After studying at Cambridge, where he received a degree in 1736, he became a clergyman. In 1738 he received a charge near York and soon began to devote a part of his time to literary work. He published "Life and Opinions of Tristram Shandy" in 1759, which immediately attained a high repute on account of its interesting style and elegant humor. The first two volumes were succeeded in the latter part of

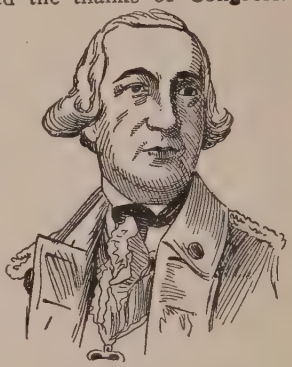
the same year by two others. The fifth and sixth volumes appeared in 1762, the seventh and eighth in 1764, and the ninth in 1766. In the meantime he published four volumes of sermons and in 1768 issued "Sentimental Journey Through France and Italy."

STETHOSCOPE (stĕth'ō-skōp). See **Auscultation.**

STETTIN (stĕt-tēn'), a seaport city of Germany, capital of Pomerania, eighty miles northeast of Berlin. It occupies a commanding position on the west bank of the Oder River, about thirty miles from the Baltic Sea, and is noted as a railroad center. Opposite the city are the two former suburbs of Lastadie and Silberwiese, with which it is connected by two substantial bridges. The important buildings include those occupied by the government officials, the Church of Saint Peter, a Gothic structure founded in 1124, the city hall, the citadel, the central railroad station, and many fine school and church buildings. Other features include the Berliner Thor and many monuments. The streets are substantially paved with stone and asphalt and are regularly platted. Stettiner Haff is an expansion of the Oder River north of the city and has an area of 200 square miles. It is an important waterway, having deep-sea and excellent canal connections. The city of Stettin has long been an important port. It was an influential member of the Hanseatic League. From 1648 until 1720 it was occupied by the Swedes and was a French possession from 1806 to 1813. Population, 1905, 224,119; in 1920, 236,145.

STETTINIUS, Edward R., financier, born at St. Louis, Mo., Feb. 15, 1865. He studied at the University of St. Louis and removed to Chicago, where he operated on the board of trade, purchasing and selling grain. In 1893 he engaged in manufacturing enterprises, first in making water tube boilers and later in matches, and in 1909 became president of the Diamond Match Company. Subsequently he removed to New York and became a partner in the firm of J. P. Morgan and Company. At the time the United States entered the Great European War, in 1917, he was made surveyor general of purchases in the war department, in which position he was highly efficient. He died Sept. 3, 1925.

STEUBEN (stū'bĕn), **Frederick William August, Baron von,** eminent general, born in Magdeburg, Germany, Nov. 15, 1730; died at Steubenville, near Utica, N. Y., Nov. 28, 1794. He studied at Neisse and Breslau and served as a volunteer under a command of his father at the siege of Prague, in 1745. After remaining with the Prussian army throughout the Seven Years' War, he became adjutant general and was made aid to Frederick the Great, in 1762. Subsequently he retired from military service, receiving a lucrative government position, and was made a baron. In 1777 he sailed for America to assist the colonists against the British. He was appointed a major general and later inspector general of the American army. While in that capacity he organized and disciplined the forces in such an efficient manner that he was accorded the thanks of Congress. Much of his active military service was in New Jersey and the Carolinas. Steuben was a member of the court-martial on the trial of Major André. Subsequently he checked the invasion of Connecticut by Benedict Arnold and was present at Yorktown when Cornwallis surrendered. In 1790 Congress granted him a township of land near Utica, N. Y., a pension of $2,400, and several tracts of land in Virginia and Pennsylvania. He settled on his land in New York, where he was resident at the time of his death.



BARON VON STEUBEN.

STEUBENVILLE (stū'bĕn-vĭl), a city in Ohio, county seat of Jefferson County, on the Ohio River, 62 miles below Pittsburg. It is on several hard surfaced State and interstate highways, the Pennsylvania, and the Wheeling and Lake Erie railroads. In the vicinity are productive coal mines and gas wells, giving it material advantage for manufacturing. Among the noteworthy buildings are the county courthouse, the Gill Hospital, the Carnegie Library, the city hall, the high school, and the Y. M. C. A. building. It has Stanton Park and Altamont Park. It is the center of a large trade in coal, merchandise, and farm produce. The manufactures include pottery, glass, furniture, iron, white lead, paper, cotton and woolen goods, and machinery. Among the municipal facilities are gas and electric lighting, pavements, waterworks, sewerage, and street railways. The city occupies the site of Fort Steuben, which was founded and named for Baron Steuben in 1787. Population, 1900, 14,349; in 1920, 28,508.

STEVENS (stē'vĕnz), **Alfred George,** sculptor, born in Blandford, England, Jan. 28, 1818; died in London, May 1, 1875. He was the son of a house decorator and developed ability in designing while aiding his father. In 1833 he went to Italy, where he remained nine years and a part of the time received instruction from Thorwaldsen. He taught architectural drawing in the London School of Design from 1845 to 1848 and subsequently devoted most of his time to decorative modeling. His best work in sculpture is the monument to Wellington for Saint Paul's Cathedral, London, which is classed among the most noted productions of the last century.

STEVENS, Thaddeus, statesman, born in Danville, Vt., April 4, 1792; died in Washington, D. C., Aug. 11, 1868. After graduating from Dartmouth College in 1814, he settled at Lancaster, Pa., to practice law, and was soor after elected as a Whig to the State Legislature In 1849 he became a member of Congress, serving in that body as an influential representative until 1853, and was a distinguished opponent of the Compromise of 1850, including the Fugitive Slave Law. He went with the northern Whigs into the Republican party and was elected to Congress in 1859, where he retained membership until his death. During that period he was one of the most influential leaders on the floor of the house and as such urged emancipation, the adoption of the Fourteenth Amendment to the Constitution, and the impeachment of President Johnson. Though bitter in his attacks upon those differing from him, he was a man of deep charity and strong influence. He gave a part of his estate to establish an asylum for orphans at Lancaster.

STEVENSON, Adlai Ewing, statesman, born in Christian County, Kentucky, Oct. 23, 1835. His family removed to Bloomington, Ill., in 1852. After attending Central College, he studied law and in 1858 became an attorney in Woodford County, serving as State's attorney from 1864 to 1868. In the latter year he settled at Bloomington to practice his profession. He was elected to Congress as a Democrat in 1876 and was reëlected in 1878. President Cleveland appointed him first Assistant Postmaster General in 1885, and in 1892 he was elected Vice President of the United States. At the close of his term, in 1897, he was appointed commissioner on international bimetallism. In 1900 he was nominated for Vice President by the Democrats, but sustained defeat along with the national ticket, receiving 6,342,514 of the popular votes. He was nominated as a Democrat for Governor of Illinois in 1908, when he ran many thousand votes ahead of his ticket, but did not receive sufficient support to be elected. He died June 14, 1914.

STEVENSON, Robert, engineer, born at Glasgow, Scotland, June 8, 1772; died July 12, 1850. His father died at an early age and he worked with his stepfather, Thomas Smith, in the construction of lighthouses. In 1791 he was sent to erect a lighthouse on the island of Little Cumbrae and later was civil engineer in the construction of county roads. He is the inventor of a system of intermittent and flashing lights and the builder of the Bell Rock Lighthouse, of which he published an account in 1824.

STEVENSON, Robert Louis Balfour, novelist and essayist, born in Edinburgh, Scotland, Nov. 30, 1850; died Dec. 3, 1894. He descended from a family noted as lighthouse engineers and was intended by his father for the same profession, but early became interested in sketching and literature. After studying at the University of Edinburgh, he was called to the bar, but instead of practicing law turned his attention to literary research. His first writings appeared in *Macmillan's Magazine,* but he suffered from poor health and went on several extended tours, partly for the purpose of gaining strength and partly to enrich his mind. After proceeding to France, he came to America and crossed the American continent in an emigrant train. He frequented several Californian resorts, spent much time in the Adirondack Mountains of New York, and in 1887 settled in Samoa. While in California, in 1879, he married a widow, and her son, Lloyd Osborne, became his companion and assistant. In Samoa he purchased an estate called Vailima, where he died.

ROBERT L. STEVENSON.

The writings of Stevenson are very numerous, including poems for children, many essays, and excellent stories, all of which show remarkable power of discernment and excellence of style. Among his most noted writings are "Treasure Island," "Northern Lights," "Footnote to History," "Familiar Studies of Men and Books," "Memoir of Fleeming Jenkin," "Pentland Rising," "Travels with a Donkey in the Cevennes," "New Arabian Nights," "Prince Otto," and "Merry Men and Other Tales." His "Silverado Squatters," dealing with events in California, was completed in 1883, and his "Across the Plains," treating of his trip from New York to San Francisco, was published in 1892. His work entitled "Strange Case of Dr. Jekyll and Mr. Hyde" was written in 1886 and is a study of double-consciousness. It has been dramatized several times and made the subject of numerous lectures. His "Vailima Letters" was published shortly after his death. It is a production remarkable for its fine exhibit of the beauty and interest found by the author in the Samoan Islands.

STEVENS POINT, a city in Wisconsin, county seat of Portage County, 85 miles west of Green Bay. It is nicely situated on the Wisconsin River, on the Soo Line and the Green Bay and Western railroads, and has a large trade in agricultural products, lumber, and merchandise. Among the principal buildings are the county courthouse, the Carnegie Library, the public high schools, and one of the State normal schools. The manufactures include flour, cigars, lumber products, railroad cars, leather, paper, ironware, and machinery. It has electric lights, pavements, street railways,

public waterworks, and several parks. Stevens Point was settled in 1836 and was chartered as a city in 1897. Population, 1920, 11,371.

STEWART (stū'ĕrt), **Alexander Turney,** merchant, born near Belfast, Ireland, Oct. 27, 1803; died April 10, 1876. He studied at Trinity College, Dublin, but emigrated to the United States before graduating. For some time he taught school in the vicinity of New York City. In 1825 he established a dry-goods business and subsequently founded one of the largest stores in the world on Broadway Street, New York City. He had branch offices in many countries in Europe and employed about 8,000 persons in his business of manufacturing and selling. In 1876 he was sent as a commissioner from the United States to the exposition at Paris, France.

STEWART, Balfour, physicist, born in Edinburgh, Scotland, Nov. 1, 1828; died near Drogheda, Ireland, Dec. 10, 1887. He studied at Saint Andrews and Edinburgh University and in 1859 became director of the Kew Observatory. In 1870 he was made professor of physics at Owens College, Manchester, where he conducted important investigations regarding terrestrial magnetism and the relation between temperature and sun spots. He is regarded one of the originators of the theory of spectrum analysis. His writings include "Conservation of Energy," "Radiant Heat," "Physical Speculations on a Future State," and "Elementary Treatise in Physics."

STEWART, William Morris, lawyer and statesman, born in Lyons, N. Y., Aug. 9, 1827; died April 23, 1909. In 1848 he entered Yale, but did not complete the course by graduation. However, he was given the degree of master of arts in 1865. In 1850 he went to California to seek his fortune in the development of gold fields, where he read law and was admitted to the bar. He was appointed attorney general of California in 1854 and removed to Nevada in 1860, where he became connected with the company that developed the Comstock Lode. In 1861 he was a member of the Nevada territorial council and became a United States Senator in 1864, serving in that body until 1875, when he resumed the practice of law in Nevada. He was reëlected to the United States Senate in 1887, in 1893, and in 1899. Stewart was identified with the Republican party until 1896, when he supported Bryan and bimetallism. His publications include a number of speeches and addresses.

STEYN (stīn), **Martinus Theunis,** general and statesman, born in Winburg, South Africa, Oct. 2, 1857; died Nov. 28, 1916. He studied at Bloemfontein and later at Wevente, Holland. Subsequently he took a course in law at London. Steyn was admitted to the bar in 1882, but immediately went to Bloemfontein to practice his profession, where he became state attorney in 1889. In 1893 he was made supreme judge of the Orange Free State and on March 4, 1896, became president of that country. During his administration a defensive alliance was made with the Transvaal Republic, the two republics agreeing to act conjointly in case of foreign interference. At the beginning of war between the Transvaal Republic and Great Britain his forces immediately entered the field. He proved his efficiency as a military commander in several decisive battles as well as in the capacity of statesman and jurist. In 1915 he was suspected of favoring the German allies.

STICKLEBACK (stĭk'k'l-băk), a genus of fish common to the fresh and salt waters of northern regions, so named from the sharp, free dorsal spines, usually ranging from two to fifteen. They are among the few fishes that build nests for the reception of the spawn, which is carefully guarded by the male until hatched and the young are capable of providing for themselves. The male assumes blue and red tints at the spawning season and actively invites females to deposit spawn in its nest until it is filled with ova, and when the young life appears it provides food for several days. The female deposits from 50 to 100 eggs, which are not confined to the nest of a single male, but distributed to the nests constructed by different individuals. Sticklebacks live only from three to four years and vary in length from two to three inches. The best known and most widely distributed species have three spines, two on the back and one beneath, and range from Maryland to Labrador. In several places off the shores of Europe and in some of the interior waters of England these fishes are so numerous that they are caught and used for manure. They are seldom eaten, though their flesh is not objectionable.

STICK-SEED, the popular name of a weed native to Europe, but now found in many places of America. The stem is hairy and about two feet high, and the small flowers bloom late in the summer. These plants produce seeds covered with small projections, hence are distributed by cattle and other animals. This weed grows in waste grounds and cultivated fields. Considerable care is required to eradicate it from cultivated land.

STILICHO (stĭl'ĭ-kō), **Flavius,** Roman general and statesman, born about 359; slain at Ravenna, Italy, Aug. 23, 408 A. D. He descended from Vandal ancestors, his father being a captain of the imperial army under Emperor Valens, and at an early age entered the imperial service. Theodosius was so impressed with his military ability and accomplished manners that he sanctioned his marriage to his niece, Serena, and in 384 appointed him as ambassador to Persia. When the emperor, in 394, bequeathed the Eastern Empire to his son Arcadius and the Western Empire to his son Honorius, he made Stilicho the guardian of the latter, with authority to administer the affairs of state in his name, while

Rufinus was made guardian of the former. Shortly after the death of Theodosius, he suppressed an uprising in Africa, and in 403 signally defeated Alaric at Pollentia. The marriage of his son to the daughter of Theodosius and that of his daughter to the son of Honorius were consummated as means to aid his family in succeeding to the imperial throne. When his pretensions were discovered and made known, they excited the opposition of Honorius, who began to plan the capture and destruction of him and his supporters. However, Stilicho made an alliance with Alaric, but was compelled to leave Rome for the purpose of repelling a barbaric invasion, and while absent the emperor caused the massacre of his friends. Shortly after his army revolted and he was compelled to flee to Ravenna, where he was slain by friends of the emperor. His sad death ended the long line of distinguished heroes who had defended Rome against the barbarians for 150 years, and within three months a horde of Visigoths under Alaric was at the gates of Rome.

STILL, Andrew Taylor, osteopath, born in Jonesboro, Va., Aug. 6, 1828; died Dec. 12, 1917. He studied at Holston College, Tenn., served as surgeon and major in the Civil War, as a volunteer from Kansas, and became the founder of osteopathy. In 1892 he was made president of the American School of Osteopathy at Kirksville, Mo. He published "Practice and Research," "Autobiography of A. T. Still," and "Philosophy of Osteopathy."

STILLMAN, William James, author and painter, born in Schenectady, N. Y., June 1, 1828; died July 6, 1901. He graduated at Union College in 1848 and the following year went to England to study painting, where he was influenced by the Pre-Raphaelites. While in Europe he became an intimate friend of Louis Kossuth, the Hungarian revolutionist, who commissioned him to secure the crown jewels of Hungary. His publications include "On the Track of Ulysses," "Autobiography of a Journalist," "Billy and Hans," and "The Cretan Insurrection."

STILLWATER, a city in Minnesota, county seat of Washington County, on the Saint Croix River, 20 miles northeast of Saint Paul. It is on the Northern Pacific, the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul railroads and has steam boat communications with the Mississippi by way of the Saint Croix River. An electric railway connects it with Saint Paul and Minneapolis. The noteworthy buildings include the county courthouse, the State prison, the public library, the high school, the city hall, the Federal building, the city hospital, and two convents. Fine scenery is afforded by the dalles of the Saint Croix, which extend thirty miles above the city. The manufactures include machinery, flour, cement, lumber products, barrels, farming implements, and ironware. It was settled in 1843 and incorporated in 1854. Population, 1920, 7,735.

STILTBIRD, or **Stilt,** a species of wading birds. It is so called because its legs, in proportion to the size of the body, exceed in length those of any other bird. The body is about the size of that of a snipe, while the bare part of the legs measures eight inches, thus enabling it to run with remarkable rapidity. It usually nests in the marshy margin of a swamp or pond, but in some instances, especially where the ground is very wet, it builds a platform in the weeds and rushes. Several well-marked species of stiltbirds are native to North America, but the *black-necked stilt* is the most widely distributed. It is a common bird in the northeastern part of North America, extending as far north as Nova Scotia. This species is fourteen inches long and has a white tail, red legs, and a black bill. A species called the *white stilt* is native to Africa and Europe.

STING RAY, a class of cartilaginous fishes of the ray family, so called from the sharp, bony spine that projects backward. These fish have a long whiplike tail, a smooth skin, flattened teeth, and a moderately broad body. About forty species have been described. They are common to the warmer seas and some inhabit the fresh waters of South America. The sting is not poisonous, but is capable of inflicting a painful wound. Some of the species are from ten to twelve feet long, hence are powerful in defending themselves against intruders.

STIRLING (stēr'lĭng), a river port of Scotland, in Stirling County, on the Forth River, 28 miles northeast of Glasgow. It has railroad facilities and the harbor is safe and convenient. The manufactures include cordage, mineral oils, leather, soap, clothing, agricultural implements, textiles, and machinery. The surrounding country is agricultural and stock raising. Among the principal buildings is the castle on Castle Hill, an eminence rising considerably above the city. It was formerly a noted resort of the Stuarts. In 1452 James II. stabbed the Earl of Douglas in a room of this castle. In connection with the castle are buildings dedicated to James III., James V., and James VI. The East Church of Stirling was erected by James IV. in 1494 and is still in an excellent condition. Other important buildings include the Cowan Hospital, the Corn Exchange, the Smith Institute, and numerous educational and charitable institutions. Monk captured the place in 1651 and in 1745 it was unsuccessfully besieged by the Highlanders. Population, 1922, 18,942.

STIRLING, James Hutchinson, philosopher, born in Glasgow, Scotland, Jan. 22, 1820; died in 1909. After studying in the Glasgow University, he practiced medicine in Wales, but later took an advanced course in philosophy in Germany. In 1865 he published a philosophic work entitled "The Secret of Hegel," drawn largely from the works of the German philosophers, but it gave him considerable standing as a writer. He became a lecturer on natural theology at Edin-

burgh in 1888. Among his best known writings are "As Regards Protoplasm," "Philosophy of Law," "Community of Property," "Burns in Drama," and essays on Macaulay, Jerrold, Tennyson, and several other noted writers. He translated from the German "Text-Book to Kant" and Schwegler's "Hand-book of the History of Philosophy."

STIRLING, Sir Thomas, soldier, born in Scotland about 1735; died May 9, 1808. He entered the military service and in 1757 became captain in the Royal Highlanders. During the French and Indian Wars he served in America, taking part under Abercrombie at Lake George in 1758 and under Amherst at Lake Champlain in 1759. The following year he was at the siege of Niagara, took part in the invasion of Lower Canada, and subsequently was stationed at Fort Chartres, Ill. He served in the British army throughout the Revolutionary War, taking part in the battles of Brandywine, Long Island, and Fort Washington. In 1801 he was promoted to the rank of a general.

STOCKBRIDGE (stŏk'brĭj), a town of Massachusetts, in Berkshire County, 16 miles south of Pittsfield. It is situated on the Housatonic River and the New York, New Haven and Hartford Railroad, and is surrounded by the Berkshire Hills. It is celebrated as the seat of an Indian mission established in 1736 for the benefit of the Stockbridge Indians, who were converted to Christianity under the teaching of John Sargent and Jonathan Edwards. These Indians numbered about 400 and their descendants are now living in the vicinity of Green Bay, Wis., where they engage largely in farming. Near Stockbridge, in the vicinity of Lake Mahkeenac, are the remains of the house in which Hawthorne wrote "The House of the Seven Gables." The town contains a monument of Jonathan Edwards, a park presented by Cyrus W. Field, and a public library. In the vicinity is a narrow gorge known as Ice Glen, where certain caves contain ice throughout the year. Population, 1905, 2,265; in 1920, 1,764.

STOCK EXCHANGE, an institution organized and maintained by brokers and capitalists, designed as a market for the purchase and sale of various securities, such as public stocks and shares. Institutions of this class are incorporated under the laws of the state where they are organized, and business is conducted on a cash basis. The New York Stock Exchange was founded in 1792 and is the largest and most important in America. Other important institutions of this kind are located at Philadelphia, Chicago, Toronto, Montreal, Boston, and San Francisco. The stock exchange of Chicago is one of the newest, but takes a high rank in the volume of business annually transacted. *Stock jobbing* is a speculative business on the stock exchange. It is concerned exclusively with time bargains, in which there is no transfer of stock, but simply a payment of the differences by the buyer or seller according to its value above or below the price named in the bargain, the settlement being made at the time previously specified. This business partakes of the nature of gambling in many stock exchanges, while in others it is not permitted, but the actual delivery of stock is required.

STOCKHOLM (stŏk'hōlm), the capital and largest city of Sweden, situated between Lake Mälar and the Baltic Sea, about 325 miles northeast of Copenhagen, Denmark. It occupies an attractive site on several islands and the adjacent mainland and is one of the most beautiful capital cities of Europe. Numerous substantial bridges connect the *holms,* or islands, with each other and with the mainland, and it has extensive steamboat and railroad facilities. The city was founded on an island at the mouth of Lake Mälar in the 13th century by Birger Jarl, when the government desired to make it the center of commercial enterprises with other towns of Sweden and Norway. Growth was slow until the beginning of the last century, when the building of railroads and dock improvements gave it a place as the most important commercial city of the Scandinavian peninsula. At present no European city has finer paved streets or is more carefully guarded as to sanitary regulations, while its public gardens, parade grounds, and other municipal improvements take very high rank. The streets are lighted by gas and electricity, have an excellent system of rapid transit, and are straight and regularly platted in the principal parts of the city. It has many beautiful public gardens, telephones, sewerage, and equestrian fountains. In the older quarters the pavements are inferior, and the streets are narrow, but stone and brick are replacing the wooden structures.

Among the noteworthy buildings is the palace, a fine Italian structure dating from 1753, and near it is a statue of Gustavus III. Adjacent to the palace are numerous gardens, a gallery of paintings, a museum, and a splendid national library. Other buildings of note include the College of Surgery, the council house, the Saint Nicolai's Cathedral, the Church of Saint James, the observatory, and the Knight's Hall. The noteworthy statues include the one in the Hof Garden dedicated to Linnaeus, the statue of Gustavus Vasa near the Knight's Hall, and several others erected in honor of Swedish kings. Gustavsholm, the largest of the islands, is the most densely populated part of the city and has the finest buildings, while on Ship Island is the seat of the Swedish navy, and on Ladugaard's Island are romantic glens and picturesque heights. The city is well supplied with public schools, numerous scientific and benevolent associations, and a number of institutions of higher learning. Practically all the people are Protestants and members of the Lutheran Church. Illiteracy has been reduced to a remarkably low per cent. The manufactures in-

clude cotton textiles, woolen and silk goods, porcelain, leather, glass, ribbons, sugar, tobacco products, ironware, sailing vessels, steam engines, machinery, and hardware. Stockholm has a large export and import trade, steamboat connections being maintained with all the leading ports of the world. The Danes under Christian II. captured the city in 1520, when an atrocious massacre resulted. The Treaty of Stockholm, concluded in 1855, guaranteed the preservation of Swedish supremacy. Population, 1906, 332,738; in 1922, 445,168.

STOCKPORT (stŏk'pōrt), a city of England, at the confluence of the Mersey and Thames rivers, five miles southeast of Manchester. It is at the junction of a number of important railroads, giving it a large trade in produce and merchandise. The chief manufactures are cotton and woolen goods, hardware, engines, spirituous liquors, and machinery. The surrounding country is fertile, supplying large quantities of cereals and live stock for its market. Among the principal buildings are the Saint Mary's Church, the free library, the free grammar school, and a museum. In Saint Peter's Square is a statue of Richard Cobden. Bituminous coal is mined in the vicinity. The Romans had a station on the site of Stockport, from which a town gradually developed that in 1644 was taken by Prince Rupert. Population, 1921, 108,693.

STOCKTON (stŏk'tŭn), a city in California, county seat of San Joaquin County, on the San Joaquin River, at the head of navigation. It is on the Southern Pacific and the Atchison, Topeka and Santa Fé railroads. The streets are well platted and substantially paved. It has systems of gas and electric lighting, sewerage, waterworks, and electric railways. The noteworthy buildings include the county courthouse, the Federal post office, the public library, the Masonic Temple, the State hospital for the insane, the Saint Mary's College, the city hall, the Pacific Hospital, the high schools, and the Saint Joseph's Home. Among the manufactures are flour, woolen goods, macaroni, bread, ironware, wagons, and farming implements. It was founded in 1849 and incorporated as a city in 1850. Population, 1900, 17,506; in 1920, 40,206.

STOCKTON, Francis Richard, novelist, born in Philadelphia, Pa., April 5, 1834; died in Washington, D. C., April 20, 1902. He studied in the central high school of Philadelphia and engaged as an engraver and draughtsman, but in 1866 became a journalist. He wrote successively for the Philadelphia *Post, Scribner's Monthly,* and the *Riverside Magazine,* and was for a time assistant editor of *Saint Nicholas.* His short stories are very popular. They were first published in the *Riverside Magazine* and afterward collected under the title, "Ting-a-Ling Stories." In 1879 he published "Rudder Grange," a series of stories noted for their originality and quaint humor. Other writings from his pen include "Christmas Wreck," "The Lady or the Tiger," "The Hundredth Man," "The Adventures of Captain Horn," "Pomona's Travels," " The Bee Man of Orn and Other Fanciful Stories," "Mrs. Cliff's Yacht," and "The Story of Viteau."

STOCKTON, Robert Field, naval officer, born in Princeton, N. J., Aug. 20, 1795; died there Oct. 7, 1866. He was a grandson of Richard Stockton (1730-1781), a signer of the Declaration of Independence, and in 1811 entered the United States navy as midshipman. In the War of 1812 he took part in the defense of Baltimore, succeeding to the rank of lieutenant, and in 1821 was sent to Africa to take part in the war with Algeria and to aid in securing colonization rights in the republic of Liberia. After returning to America, he was engaged in private business in New Jersey from 1823 to 1838 and in the meantime promoted the construction of the Delaware and Raritan Canal. He reëntered the navy in 1838 and in 1845 was made commander of the Pacific squadron, taking possession of California for the United States government. Soon after he negotiated a treaty by which California was transferred from Mexico to the United States. He retired permanently from the navy in 1850, and from 1851 to 1853 served as United States Senator. In 1861 he was a member of the American Peace Congress that met in Washington.

STODDARD (stŏd'dĕrd), **Richard Henry,** author, born in Hingham, Mass., July 2, 1825; died May 12, 1903. After attending the public schools of New York City, he worked in an iron foundry and in the meantime took an interest in privately studying literature. His first publication was issued in 1849, entitled "Foot Prints," and in 1852 he published a second volume of poems. He served in the New York customhouse from 1853 to 1870 and in the latter year became clerk to General McClellan. For ten years he was a literary writer for the New York *World,* and became literary editor of the New York *Mail and Express* in 1880. Among his poetic works are "Book of the East," "Songs in Summer," "The Lion's Cub," "The King's Bell," "The Children in the Wood," and "Life, Travels, and Books of Alexander von Humboldt." He edited Rufus W. Griswold's "Loves and Heroines of the Poets," "Poets and Poetry of America," and "Female Poets of America."

STODDARD, William Osborn, author and journalist, born at Homer, N. Y., Sept. 24, 1835. He graduated at the University of Rochester in 1857 and took up farming, but after three years engaged in newspaper work in Illinois. For some time he was editor of the Chicago *Daily Ledger* and became a volunteer at the outbreak of the Civil War. After serving three months, in 1861, he became private secretary to President Lincoln, and after three years was made United States marshal of Arkansas. After 1866 he devoted his time chiefly to literature and journalism, publishing a large number of poems, biographies, and works of fiction. Among his chief

books are "Verses of Many Days," "Life of Abraham Lincoln," "Lives of the Presidents," "The White House in War Times," "The Red Patriot," "Success Against Odds," "The Spy of Yorktown," "Long Bridge Boys," and "The Swordmaker's Inn." He died Aug. 29, 1925.

STOICS (stō'ĭks), the adherents of a speculative philosophy, known as *Stoicism,* which was first taught in Greece and later in Rome. The Stoic school of philosophy was founded by Zeno at Athens about 308 B. C., and was so called because its founder taught on a porch, or *stoa,* which became the gathering place of his disciples and friends. The Stoics drew their philosophy mainly from their predecessors, especially from Socrates and Aristotle. They taught that a rational soul is inherent only in man, and, though his body is formed quite like that of lower animals, he has reason and intelligence like the gods; hence, all his other faculties should be brought into subjection to reason. In their system only one God was recognized. He was regarded the father of all men and was thought to give unity, beauty, and adaptation to matter and force, the two ultimate principles of the universe. Their system eliminated as dangerous all that interfered with purely intellectual existence. In this their system possessed its chief merit, since a close observance of these tenets led man to subdue his passions and senses, and thus he became freed from all extravagances that might lead to mere sensual pleasure and operate only to gratify personal ends.

STOKES, Whitley, author and Celtic scholar, born in Dublin, Ireland, Feb. 28, 1830; died Apr. 13, 1909. He graduated at Trinity College, studied law in the Inner Temple, and in 1862 went to India to engage in the practice of law. While there he held several important positions under the government, drafted *The Code of Civil Procedure,* and became eminent as a Celtic scholar. Besides making a careful study of the early Irish, he made extensive investigations of the Cornish and British. His work has contributed largely to a better understanding of the ancient Irish language and the literature and history of the Irish people. Among his many works are "Three Middle-Irish Homilies," "Three Irish Glossaries," "Tripartite Life of Saint Patrick," "Old Irish Glosses at Würzburg and Carlsruhe," "Passion, a Middle-Cornish Poem," "Martyrology of Gorman," and "Lives of Saints from the Book of Sismore."

STOKE-UPON-TRENT, a city in England, on the Trent River, 14 miles north of Stafford. It is situated on the Trent and Mersey Canal and several railroads. Among the chief buildings are the public library, the Minton Memorial building, the townhall, and the Gothic church. It has statues of Wedgewood, Minton, and Colin Minton Campbell. Pottery is the chief manufacture. The place is famous for its production of ironware, porcelain, earthenware, brick, and machinery. The surrounding country is fertile, producing cereals and fruits. It has valuable deposits of bituminous coal. The place was incorporated in 1874. Population, 1921, 254,553.

STOLA (stō'lȧ), a long garment worn over the tunic by the women of ancient Rome. It extended to the ankles, had a flounce below and broad folds above the breast, and was secured to the body by a girdle. Courtesans and women who had been divorced from their husbands were not permitted to wear the stola.

STOMACH (stŭm'ȧk), a dilated part of the alimentary canal, serving as one of the principal organs of digestion. The human stomach is somewhat pear-shaped and has a capacity of about three pints. It is situated on the left side of the abdomen, under the diaphragm, and the esophagus opens into it from above. The esophagus forms the tube through which the masticated food enters. An opening called the *pylorus,* a constriction near the smaller extremity of the stomach, allows passage into the small intestine, which has its beginning at that part of the alimentary canal. The stomach is composed of four layers: the serous, the muscular, the areola or submucous, and the mucous coats. The *outer,* or *serous, layer* is thin, transparent, and smooth, and is a part of the lining of the abdomen. The fibers of the *muscular layer* are arranged lengthwise, obliquely, and circularly. The *areola coat,* or *submucous layer,* contains blood vessels and lymphatics. The *mucous coat,* or *inner layer,* is provided with multitudes of glands, which secrete the gastric juice. This fluid is colorless and watery. It has a sour taste and odor and contains hydrochloric acid and a ferment body called *pepsin.* The function of the stomach is to aid in digestion, and, when food enters, the gastric juice is poured out freely to change the insoluble proteids into soluble and diffusible substances, called *peptones.*

Muscular contractions serve to churn the contents of the stomach and thoroughly mix the food with mucus and juice, thus reducing it to a creamy fluid called *chyme,* which passes into the small intestine through the pylorus. This motion is independent of the will, and upon its vigorous action depends in a large measure healthful digestion. It is highly essential that the hygiene of the stomach be carefully observed, since health and bodily strength depend in a large measure upon healthful digestion. Its work is facilitated by chewing the food with care so as to mix it thoroughly with saliva. A large quantity of liquids taken at the time of eating dilutes the gastric juice, and cold water tends to check its flow for a time. A short period of rest just preceding and following a meal is healthful, and regularity in eating is likewise important, since a lapse of five to six hours between meals gives the stomach a brief period of rest. Persons with weak stomachs should be careful in the selection and preparation of their food, for the reason that skillful cookery and the choice of easily digested varieties are helpful.

Many animals have stomachs constructed quite similarly to that of man, but in others it is very different. In the kangaroo the stomach has two elongated sacs, in the camel it is divided into two compartments by a muscular band, in birds there are three small but distinct dilations of the alimentary canal, and in reptiles the stomach is a mere modification of the esophagus. Most invertebrates have a digestive tract with functions similar to those of the stomach in vertebrates. Among the diseases of the stomach are gastritis, cancer, and dyspepsia.

STONE, the name applied to all solid mineral substances, such as clay, lime, silex, and the rocks obtained by quarrying. The last mentioned include granite, limestone, marble, slate, and sandstone, all of which are used extensively for building purposes. Durable stones were esteemed highly as material for construction work in ancient times, and their use has been extensive in all periods of history for building aqueducts, bridges, and edifices. Indeed, the ancients possessed the power of quarrying and moving stone as large as any transported in modern times, and in some cases complete structures were hollowed out of single blocks and transported long distances. Herodotus describes such a structure completed on the Isle of Elephantiné and transported by Amasis to Sais, a distance equal to the ordinary sailing of twenty days. It was about 10 feet high, 18 feet wide, and 27 feet long, outside measurement, and the room within was 24 by 15 feet and 6.6 feet high. It is estimated that the weight was 9,944,750 pounds. The largest mass of stone that has been transported in modern times is the pedestal of the statue of Peter the Great at Saint Petersburg, which weighs 3,234,000 pounds. After finding that rollers made of wood and iron were insufficient to transport this immense mass of stone, balls made of an alloy of tin, copper, and zinc were used.

Granite is the most durable stone under exposure to the weather, as in monuments and the outer walls of buildings. Sandstone is used extensively for architectural structures, but it disintegrates in climates where the atmosphere is alternately dry and wet, or warm and extremely cold. This is true likewise of marble, but this stone is an excellent material for finishing and decorating the interior. Slate is employed extensively for roofing. In modern times artificial stone made in the form of a concreted material is used extensively, especially in vases, tiles, building blocks, sidewalks, sewer pipes, tunnels, and bridges. See **Concrete.**

STONE, Lucy, reform advocate, born in West Brookfield, Mass., Aug. 13, 1818; died Oct. 18, 1893. She graduated from Oberlin College in 1847 and immediately engaged as a lecturer for the American Antislavery Society. In 1855 she married Henry B. Blackwell, but under a previously contracted agreement retained her maiden name. She lectured extensively on woman suffrage and in 1869 was one of the organizers of the Woman's Suffrage Association. The following year she became an active contributor to the Boston *Woman's Journal* and until 1882 traveled in nearly all the states, lecturing and organizing local societies. She took high rank both as a writer and an advocate in reform movements.

STONE AGE, the term applied to a period of time, or a condition of civilization, which is marked by the use of tools and weapons made of stone, instead of metals. When employed in this sense the term age does not imply a fixed number of years, but signifies a period of time in which certain conditions existed, and the period covered may be of long or short extent, or of early or recent occurrence. Besides, the stone age is of variant length and confined to different periods in the history of peoples not closely associated. For instance, the stone age is thought to have ended in Europe about the year 1200 B. C., while it existed among the Eskimos of the extreme north up to the latter part of the last century, and it still continues among the islanders of the South Pacific. Some writers have divided the stone age into two periods, known as the *paleolithic,* or *earlier,* and the *neolithic,* or *later.* This distinction is made because the implements of the paleolithic age are found with the remains of animals now extinct, while the remains of tools of the neolithic period occur with animal remains resulting from species represented by living forms. The former are different in that they are rudely constructed and entirely of flint, while the latter are finely formed and polished and in many cases they are made of various kinds of stone.

Implements of bone occur in both periods of the stone age, but their construction is marked by greater fineness in the later period. Among the implements are arrowheads, daggers, spears, ax-hammers, knives, borers, saws, chisels, scrapers, and hatchets. Highly polished axes of fibrolite and jade have been found in the vicinity of Lake Constance, Switzerland, and near Breslau, Germany. The American Indians left many remains of stone implements, especially axes, hammers, hatchets, spears, arrowheads, and utensils for performing domestic work. Many elaborate collections of remains of this kind have been made, one of the most noted being in the State historical building at Des Moines, Iowa. A large number of remains of the stone age have been secured from the mounds of the Mississippi valley and from the cave dwellings in New Mexico and the surrounding regions. Excavations and explorations of mounds and caves have led to the conclusion that the primitive peoples practiced agriculture, reared domestic animals, and possessed apparatus for catching fresh-water and deep-sea fishes. The stone age was succeeded by the bronze age and that again by the iron age.

STONECHAT, a bird of the warbler family,

native to the region extending from Central Europe to the northern part of Africa. It has a short bill and long and rounded wings. The male is finely colored, being chestnut in front and lighter backward. The female is somewhat smaller in size and duller in coloring. This bird is migratory on the continent of Europe, moving southward in winter, but remains throughout the year in England.

STONE CIRCLES, or **Standing Stones,** a class of monuments used by prehistoric people to indicate their burial grounds, of which traces still remain in many regions. In some places several stones were set upright to indicate an isolated grave, and in others a complete circle of stones was erected to inclose a burial ground. Remains of this kind are called *cromlechs* in France, *Druidical circles* in Britain, and *domrings* in Scandinavia, but all show more or less relation as to time and circumstances. It is thought that these remains date from the bronze age. A remarkable instance is on the Orkney Islands, north of Scotland, where an ancient stone circle is surrounded by a trench six feet deep and thirty feet wide. It originally inclosed two and a half acres, and about a dozen stones from six to fourteen feet high are still standing.

Stonehenge is the name applied to an extensive group of standing stones in Salisbury Plain, about seven miles north of Salisbury, England.

STONEHENGE IN SALISBURY PLAIN.

which is shown in the illustration. It consists of a large central stone, around which are two circles and two ovals. The inner circle consisted originally of about forty stones, which were six feet high, and the outer of about thirty upright stones with an equal number of blocks placed across the top. The two circles are about nine feet apart and at present 43 stones still remain, though fifteen have fallen or were broken down. Besides these, a number of the stones forming the two ovals are still to be seen. The largest stones are fifteen feet above the surface of the ground and indicate that they were hewn and brought from a distance. It is thought that they are of Druidical origin, but writers differ as to the period from which they date, some placing their construction one hundred years before Christ and others in the 5th century of our era. Few traces of such remains are found in South Europe and North Africa.

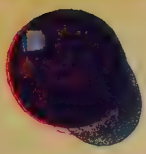
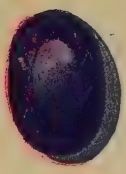
STONEHAM (stōn'ăm), a town of Massachusetts, in Middlesex County, 9 miles north of Boston, with which it is connected by the Boston and Maine Railroad. The features include the high school, the public library, the townhall, and the public park. It has manufactures of boots and shoes, leather, boxes, and machinery. The place was settled in 1670, but remained a part of Charlestown until 1725, when it was incorporated under the present name. Population, 1905, 6,320; in 1925, 9,084.

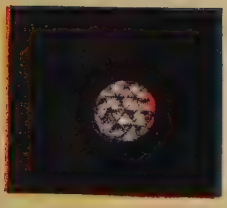
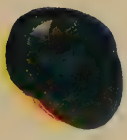
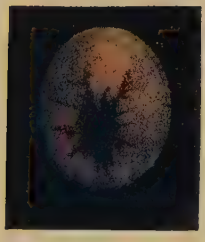
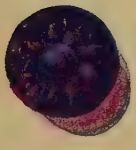
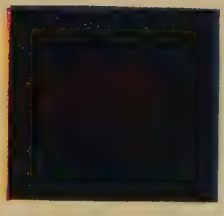
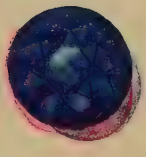
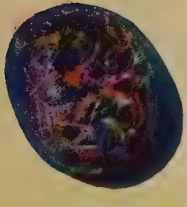
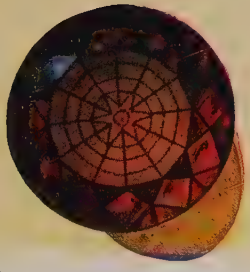
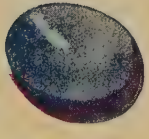
STONES. See **Geology.**

STONES, Precious, the term applied to rare and beautiful stones, often used as a synonym of gems, but the latter is more properly the name of precious stones after they have been engraved or cut to form articles of ornament. There are three general classes of precious stones and these are found widely distributed in many parts of the world. They include the carbon, alumina, and silica classes. The diamond is the only precious stone of the carbon class, being made up of pure carbon, and is the hardest of the precious stones. Stones of the alumina class are properly called *sapphires.* They are composed of pure alumina, but are colored differently, and include the true sapphire, the oriental topaz, the oriental amethyst, the oriental ruby, and the oriental emerald. To the silica class belong the opal, the amethyst, and the agates, which include the onyx, carnelian, chalcedony, sardonyx, and bloodstone. Precious stones of the silica class are formed chiefly of silica, and those closely related to the silica and alumina classes are the true topaz, true emerald, garnet, jasper, and tourmaline. Several substances derived from plants and animals are employed to a vast extent in making jewelry and for ornamental purposes. They embrace a fossil resin called amber and pearl, coral, and various shells.

Diamond, ruby, sapphire, and emerald are the most valuable of precious stones. To bring out the sparkle and luster it is necessary to cut and polish them with considerable care. Fine effects are obtained by making what are known as *cameos* and *intaglios,* the former having the design above the general surface and the latter having the design sunk below the surface. The best result in securing the finest color effect is obtained by cutting the surface smooth and rounded, while, on the other hand, the sparkle is brought out most prominently by cutting to form many faces or facets. Besides its use for ornamental purposes, the diamond has much value in cutting glass, other diamonds, and various stones. They are employed extensively for jewels in watches. Very beautiful imitations of precious stones are made of glass, called *strass,* or *paste.* It may be given a very fine color effect, with the result that it very closely resembles several kinds of the genuine.

STONY POINT, a town of New York, in Rockland County, 36 miles north of New York City, on the West Shore Railroad. It is situated on a rocky promontory of the Hudson River.

(Opp. 2750)

BIRTH STONES.

Garnet (January).
Diamond (April).
Ruby (July).
Opal (October).

Amethyst (February).
Emerald (May).
Sardonyx (August).
Topaz (November).

Bloodstone (March).
Agate (June).
Sapphire (September).
Turquoise (December).

which was fortified by the colonists in the Revolutionary War and in May, 1779, was captured by the British under Clinton. On July 16, 1779, Washington detailed General Wayne with 1,200 men to retake Stony Point, which he did by successfully surprising the British and making a gallant bayonet charge. In 1902 a national park was established here, which includes the remains of the fort. Population, 1920, 3,211.

STOPPAGE IN TRANSIT, the term applied to the stoppage of a shipment of goods while they are on the way from the seller to the buyer, owing to the fact that the shipper has not been paid. Such stoppage is not based as a manner of right upon a contract between the parties, but is permitted in mercantile usage as a protection to the seller in a case where the buyer has become insolvent. However, stoppage in transit can take place only after the goods have left the possession of the seller and before they have been delivered to the buyer; that is, they must be actually in transit. This mercantile usage was recognized judicially in England as early as 1690.

The term *milling in transit* came from a movement in political matters in the Mississippi valley about 1885. It has reference to the right of a shipper of grain to stop a car load at some intermediate point to have the grain milled or ground, when it is to be reloaded and moved to the original destination without extra payment of freight. Milling in transit has been advocated as a political measure by those who transport grain at long distances, as from Montana or North Dakota to Chicago, and in transit utilize the water power of Minneapolis for milling.

STORAX (stō'răks), a balsam obtained from the storax tree, known as *styrax* to the ancients. This tree is native to the region adjacent to the Mediterranean and the balsam is obtained by making incisions in the bark. It is a fragrant resinous substance, has an aromatic taste, and is used to some extent in medicine. After exuding from wounds in the bark, it hardens and forms reddish-yellow tears about the size of a pea.

STORER (stōr'ĕr), **Bellamy,** lawyer and diplomatist, born in Cincinnati, Ohio, Aug. 28, 1847. After graduating from Harvard University in 1867, he studied at the Cincinnati Law School and two years later began a successful practice at Cincinnati. He was made United States district attorney in 1870 and served in Congress from 1891 to 1895. President McKinley appointed him minister to Belgium in 1897 and two years later made him minister to Spain to fill the vacancy occasioned at the outbreak of the war, in 1898. After serving at the Spanish capital until 1902, he was made ambassador to Austria-Hungary, but was succeeded by Charles S. Francis, under an appointment of President Roosevelt, in 1906. He died Nov. 12, 1922.

STORK, a genus of wading birds which belongs to the heron and bittern family, most familiar in Holland and Germany. About a dozen species have been enumerated. The *common white stork* of Southwestern Europe is tall and stately, has a height of about four feet when standing, and the body measures three and a half feet in length. The bill is long and straight, the eyes are surrounded by naked skin, the neck is long and arched, and the color is white with slight black markings. The storks arrive in Germany and the greater part of Europe in February and March, and in autumn pass to the warmer regions of Asia and Africa, making their migratory movements mostly by night. They build their nests principally on the roofs of houses, but in some places boxes are provided for that purpose. In Holland it is considered fortunate for the household if a stork comes to live on the housetop, and in some countries laws have been made to protect these birds, owing to their ability to destroy reptiles and small rodents and remove offal from the streets. It is not an uncommon thing to see storks in the midst of throngs of people in some of the European cities, where they apparently move with perfect composure.

WHITE STORK.

The parents show remarkable affection toward their young, while aged birds are treated with marked kindnesses. Before migrating from their summer haunts they gather in large flocks, and, having no voice, they make a peculiar clatter with their mandibles. Storks rear annually three to five young, which they feed in their nests until matured to a stage ready for flight, when they are trained by the parents to move on the wing. The food consists mostly of lizards, small mammals, insects, snakes, frogs, fishes, and offal. A species of black stork is common to Poland and northern Germany,

whence it moves southward in the fall. The American stork, which is common to South America, and the adjutant bird are allied to the white stork.

STORMS, the familiar violent disturbances of the atmosphere which occur in the form of high winds accompanied by rain, hail, snow, or thunder and lightning. All parts of the world are subject to storms, but the most violent occur in the tropical regions, where they frequently continue without intermission for several days. Practical advance in the science of meteorology has led to the discovery of the general laws governing storms and storm centers, and, connecting with this an efficient weather bureau service, it has become possible to derive considerable profit from forecasts of atmospheric disturbances. During storms the wind varies in velocity from that of a moderately high breeze to about 200 miles per hour. When the velocity of the movement per hour does not exceed 5 miles, it is called a *gentle wind;* when not exceeding 15 miles, a *pleasant gale;* when not exceeding 25 miles, a *brisk gale;* and when not exceeding 50 miles, a *storm.* Great storms move at a velocity of 60 miles per hour; violent hurricanes, at 100; and tornadoes, at from 80 to 200.

The extent of storms varies greatly, but the larger disturbances are seldom less than 500 miles in width. They frequently pass from the equatorial region of America to the Arctic Ocean, though the velocity of the wind decreases somewhat as they move to higher latitudes. The direction of storms is influenced notably by the prevailing winds, the condition of the surface, and the slopes; while the velocity is influenced by the union of currents originating from high temperatures. It is interesting to observe that storms do not proceed uniformly in the same direction from day to day and that they vary greatly in velocity in different sections, the most violent disturbances resulting in so-called *storm centers.* Observers have noted that the great storms in North America are attended by immense whirling of the wind, thus forming a species of cyclone. The storms visiting the eastern seaboard originate in the region lying between Texas and Saskatchewan, and some of the larger of these cross the Atlantic to the northwestern coast of Europe. They begin by the winds blowing toward the area of low barometer, and during the prevalence of the storm the winds are northeast, east, or southeast.

Cyclones are storms in which the velocity of the wind is much greater than usual and the air moves in whirls or eddies, but of much greater power and diameter than in whirlwinds. They are called *hurricanes* in the West Indies and *typhoons* in the China Sea and the Indian Ocean. Cyclones have their origin in marked differences of temperature, usually at the change of the monsoon after the intense heat of summer is over. They are attended by excessive rainfall and intense lightning and thunder. Tornadoes and whirlwinds are more limited in area than the cyclones, but they belong to the same class of atmospheric disturbances. Their velocity and violence often exceed that of cyclones. It is thought that they originate from the rotary motion of the air occurring above the earth's surface, which results in a rapid movement upward of the warmer air near the surface. Storms of this class, but of small extent, are not infrequent in many sections of Canada and the United States. Their course is generally toward the northeast and their extent ranges from a few yards to a mile in width, but in many cases their power is spent after traveling from 100 to 200 miles. It has been observed that these local storms have a tendency to rise and fall like a bouncing ball, thus touching the surface only at intervals.

STORM ON THE OCEAN.

Vast storms driving fine particles of snow frequent practically all the regions which have a plain or open surface, and are known as *blizzards,* or *snowstorms.* They occur as moderately high winds and in many sections vast drifts of snow are carried into ravines and railroad cuts, the latter being usually protected by snow fences, which serve to stop the snow that is

driven along the surface. Systematic study of the occurrence and direction of winds has led to the establishment of regular routes of travel across the ocean and, when advantage is taken of them and of ocean currents, the time required by vessels for sailing from one port to another is diminished materially. Storms have a modifying effect upon the character of seasons in various sections. This is due to their influence in carrying moisture from the region of water surfaces and to their effect in causing condensation of atmospheric vapors. In the United States, Canada, and most European countries, storm and weather charts are published regularly, thus indicating the probable effect upon commercial traffic and soil productions. See **Cyclone; Signal Service; Weather.**

STORRS (stôrz), **Richard Salter,** clergyman and author, born in Braintree, Mass., Aug. 21, 1821; died June 15, 1900. He was the son of Richard Salter Storrs (1787-1873), a Congregational clergyman, and in 1839 graduated from Amherst College. Subsequently he studied law, took a course of theology at Andover Seminary, and was ordained a clergyman of the Congregational Church. He secured a charge at Brookline, Mass., the same year, but in 1846 became pastor of the Church of the Pilgrims, in Brooklyn, N. Y. He lectured successfully at Princeton and in the Union Theological Seminary, was elected to the American Board of Foreign Missions in 1887, and for a number of years was an editor of the New York *Independent.* Besides being an eloquent and able pulpit orator, he takes high rank as a writer. Among his best known works are "The Divine Origin of Christianity Indicated by Its Historical Effects," "Constitution of the Human Soul," "Manliness in the Scholar," "Early American Spirit and the Genesis," "Broader Range and Outlook of Modern College Training," "Forty Years of Pastoral Life," and "Oration on Lincoln."

STORY (stō'rȳ), **Joseph,** jurist and educator, born in Marblehead, Mass., Sept. 18, 1779; died Sept. 10, 1845. He graduated from Harvard University in 1798, was admitted to the Massachusetts bar in 1801, and served as a Democrat in Congress from 1809 to 1810. In 1811 he was appointed as associate justice of the United States Supreme Court, which position he retained until his death. He was professor of law at Harvard from 1829 to 1845, where his success as a teacher of jurisprudence placed him among the foremost of Americans. His writings include "Conflict of Laws," "Law of Partnership," "Law of Promissory Notes," "Equity Jurisprudence," and "Commentaries on the Constitution of the United States." The last mentioned work is still the leading authority on the interpretation of the United States Constitution. He contributed articles filling 200 pages to Lieber's *Encyclopedia Americana.*

STORY, William Wetmore, lawyer, poet, and sculptor, born in Salem, Mass., Feb. 12, 1819; died in Vallombrosa, Italy, Oct. 7, 1895. He was a son of Joseph Story, the jurist, and, after graduating from Harvard in 1838, was admitted to the Massachusetts bar. After practicing the law profession for five years, he turned his attention to sculpture and literature. He was commissioned to execute a statue of his father, and, to secure aid and suggestions, proceeded to Rome, where he spent considerable time in mastering the details of Italian art. His sculptures and statues include those of Josiah Quincy, Edward Everett, George Peabody, and James Russell Lowell. Among his other productions are works entitled "Little Red Riding Hood," "The Shepherd Boy," and "Cleopatra." He published two treatises on law, entitled "Treatise on the Law of Contracts" and "Treatise on the Law of Sales." His literary works include "The Poets' Portfolio," "Conversation in a Studio," and "Later Readings." He contributed to *The Traveller* and *The Farmer's Museum.*

STOSS (stôs), **Veit,** sculptor and engraver, born at Nuremberg, Germany, in 1440; died in 1533. Very little is known about his parentage or early life. The first definite mention of him is in 1477, when he took up his residence in Cracow. In 1499 he purchased a mansion in Nuremberg, where he resided the remainder of his life. Having lived to a ripe old age, he was totally blind the latter years of his life. His works are very numerous in the galleries of Europe, and he ranks among the leading wood engravers of Germany. Among his sculptures are "The Death of the Virgin," "Monument of King Casimir IV.," "Christ on the Mount of Olives," "The Angel's Salutation," and "The Taking of Christ."

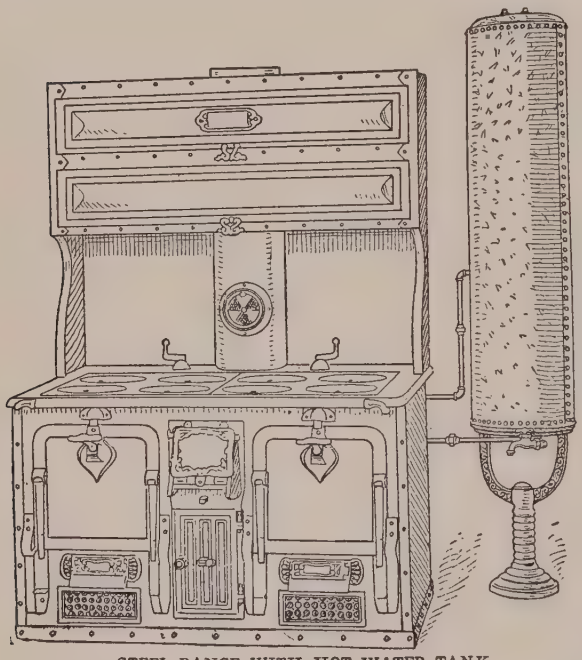
STOTHARD (stŏth'ĕrd), **Thomas,** painter, born in London, England, Aug. 17, 1755; died April 27, 1834. He was a student in the Royal Academy and began his career as a designer of patterns for the silk trade. Later he became an illustrator of books and a painter. Many of his designs were engraved and are in the British Museum. The books illustrated by him include "Robinson Crusoe" and "The Pilgrim's Progress." Among his paintings are "The Flitch of Bacon," "The Canterbury Pilgrims," "The Woodland Dance," and "Four Periods in a Sailor's Life." The illustrations made for Shakespeare's "Seven Ages of Man" are characteristic of his works.

STOUGHTON (stō'tŭn), a town of Massachusetts, in Norfolk County, 18 miles south of Boston, on the New York, New Haven and Hartford Railroad. It is surrounded by a farming and fruit-growing country. The public utilities include electric lighting, waterworks, and a library of 8,500 volumes. It has manufactures of hardware, woolen textiles, machinery, and boots and shoes. The town was incorporated in 1726. Population, 1905, 5,959; in 1925, 7,857.

STOVE, an inclosed fireplace used for cooking and for heating rooms. In former times the

open fireplace was used for these purposes and the term *stove* was applied to those that were movable and to the room itself, when so heated by a fire. Stoves constructed entirely of iron are of modern invention and were probably first used in France about 1710. Shortly after they were introduced into England and Germany. Benjamin Franklin, after he visited Europe, contributed considerable to the literature on the subject of stoves. He described one of German construction as an iron box made of five plates put together and fastened by screws, leaving one side open. This side was set outside of the room, the stove itself projecting through the wall. While all trouble from smoke within the building was thus avoided, a larger per cent. of heat and the advantage of ventilation through the stove flue were lost. In 1745 Franklin invented a stove which consisted of a rectangular box of cast-iron plates. It was so constructed that the draft was downward and the heat was distributed almost uniformly from all sides.

Stoves of modern construction came into general use about 1825 and the varieties are now very numerous, including devices for heating



STEEL RANGE WITH HOT WATER TANK.

and cooking in which wood, peat, and coal are burned. Cooking stoves used at present are made largely of sheet steel, in the form of ranges, with hot water tanks attached, and those for gas are of sheet iron and steel. Heating stoves are used extensively in the smaller towns and generally in the country, but they have been displaced largely by furnace, steam, or water heating in the cities. Stoves suitable for burning gas, gasoline, kerosene, wood, and coal are used extensively for cooking. Oil and gas stoves do not heat the room, hence are preferred for summer use, while wood and coal stoves are employed extensively where service for both cooking and heating is desired.

STOWE, Harriet Elizabeth Beecher, educator and author, born in Litchfield, Conn., June 14, 1812; died in Hartford, July 1, 1896. She was a daughter of Dr. Lyman Beecher and a sister of Henry Ward Beecher. In early childhood she developed a fondness for reading and study, thus giving her advantages from which she drew inspiration for an active and influential life. Her family removed to Cincinnati, where, in 1836, she married Calvin Ellis Stowe (1802-1886), then a teacher in the Lane Theological Seminary. Her life in Cincinnati brought her in contact with many of the evils of slavery and her interest in the cause of abolition was intensified by her husband being in close touch with a number of prominent abolitionists, all this tending to develop in her a lasting and profound interest in favor of emancipation of slaves in the United States. In 1849 she published her first book, entitled "Mayflower, or Sketches of the Descendants of the Pilgrims," and the following year her husband became professor in Bowdoin College, Brunswick, Me. It was there that she wrote her famous "Uncle Tom's Cabin" as a serial story for the *National Era,* an anti-slavery periodical published in Washington. Many of the characters and incidents of this work were taken from personal observations and from accounts of slavery given by her brother, who had been on an extended tour in the Southern States. In 1852 it was published in book form. It may be regarded as an epoch-making book. The production gives evidence of the keen intellect of its author and glows with the energy of an impassioned soul. It stirred the depths of men's hearts to appreciate sincere love of truth and right, and laid hold upon the conscience of a nation. It was a strong factor in bringing about the freedom of the slaves.

HARRIET BEECHER STOWE.

The interest in "Uncle Tom's Cabin" was not confined to the United States, but it was translated into many European and Asiatic languages. It was dramatized in twenty forms and its remarkable and continuous sales placed it among the phenomenal books of the trade. Mrs. Stowe

visited Europe in 1853 and as a result published "Sunny Memories of Foreign Lands." In 1869 she published "True Story of Lord Byron's Life," with which she created a sensation by alleging that the great poet was to blame for the separation from his wife. This was followed by exhaustive refutations from the pen of many American and English writers, but she reaffirmed her position by answering them in her work entitled "Lady Byron Vindicated." The charm of Mrs. Stowe's writings lies in her knowledge of human nature and in her exquisite sense of humor. She was an appreciative observer and a congenial companion, and possessed remarkable power of presenting her thoughts in an earnest and yet kindly spirit. Among her writings not named above are "Dred, a Tale of the Great Dismal Swamp," "Oldtown Folks," "Oldtown Fireside Stories," "The Minister's Wooing," "Pink and White Tyranny," "Betty's Bright Idea," "Pearl of Orr's Island," "My Wife and I," "Palmetto Leaves," "A Key to Uncle Tom's Cabin," "Geography for My Children," and "American Woman's Home."

STRABO (strā′bō), ancient geographer, born in Pontus, Asia Minor, about 54 B. C.; died in 21 A. D. He was of Greek descent and secured a liberal education at Amasia, in Pontus. It appears that he entered upon extensive travels soon after completing his study, visiting portions of Europe, Asia, and Africa, and by personal observation and devoted study became qualified to prepare the most valuable geographical writings of antiquity. His geographical works appeared in seventeen volumes, all but the seventh of which are still extant. In the first two books he gives an elaborate introduction, while the next eight are devoted to Europe, the six following to Asia, and the last to Africa. He published two works entitled "Continuation of Polybius" and "Historical Memoirs," but neither of them is extant.

STRADIVARI (sträd-ē-vä′rē), or **Stradivarius, Antonio,** eminent violin maker, born in Cremona, Italy, in 1644; died there, Dec. 17, 1737. He worked under Nicolo Amati until 1700, when he became an independent violin maker. Later he made guitars, mandolins, and viols, all of which he constructed of such good material and with such degree of scrutinizing care that the tone and finish have never been excelled. Many musical instruments of his make are carefully preserved and command prices ranging from $800 to $3,000. The most famous of these, called the *Dolphin* from its tone and finish, was owned by the Marquis de la Rosa.

STRAFFORD (străf′fẽrd), **Thomas Wentworth, Earl of,** statesman, born in London, England, April 13, 1593; executed May 12, 1641. He was the eldest son of Sir William Wentworth, who provided for his education at Cambridge University and later supplied the means to travel extensively in Southern Europe. In 1611 the honor of knighthood was conferred upon him and in 1614 he entered Parliament for Yorkshire, but took no prominent part in the debates until seven years later. At that time he became a leading opponent of Charles I. and the proposed war with Spain, and his ability as a speaker became recognized. He was created a baron in 1628 and made councilor and president of the north, and in 1632 became governor of Ireland. These distinguished honors gradually inclined him with more favor toward the king, but he was never his sincere friend. His administration in Ireland was generally worthy, though oppressive, but perhaps not more severe than was necessary to preserve the authority of England.

Besides improving the army in Ireland, Strafford encouraged industrial arts, suppressed piracy on the seas, and encouraged educational and commercial development. He was made Earl of Strafford in 1639, but the following year was impeached on a charge of high treason, the alleged cause being that he had expressed the opinion that his army in Ireland was sufficient to reduce the kingdom. He was accordingly convicted and ordered to be executed. When notified of his doom, he exclaimed, "Put not your trust in princes." It was the aim of the king to secure his safety, but his counselors advised him differently. Besides, Strafford had written the sovereign to ratify the bill rather than imperil his own safety. He was accordingly executed on Tower Hill.

STRAITS SETTLEMENTS, the general name of British territory in Southeastern Asia, comprising the southwestern part of the Malay peninsula and several adjacent islands. The chief divisions are the provinces of Malacca and Wellesley, on the mainland, and the islands of Singapore, Penang, and the Dindings. Besides these are a number of island dependencies, including the Christmas and Cocos islands. The area is given at 1,475 square miles. Singapore (q. v.) is the capital and most important city of these possessions. The soil is generally fertile, the climate is tropical, and the people are a mixture of Asiatics and Polynesians. Among the chief exports are sago, copra, rattan, gums, spices, canned goods, and fruits. Tin is the chief product and the tin-smelting works are counted the largest in the world. The export and import trade is important, much of which is with the United States, England, and Germany. In 1925 the exports to the United States aggregated $313,940,948 in American currency. Few railroads have been built, but the colony has several fine canals and a large mileage of improved roads. The inhabitants include 281,980 Chinese, 216,285 Malays, and 5,142 Europeans. Population, 1922, 781,424.

STRASSBURG (sträs′bo͝org), or **Strasburg,** a city in France, capital of Alsace-Lorraine, on the Ill River about two miles from the Rhine. It is situated in a fertile region of southern Alsace, has extensive railroad facilities, and

is the seat of an important commercial and manufacturing trade. A system of canals unites the Ill with the Rhine, Rhone, and Marne rivers, thus giving it water connections with the Mediterranean and the Atlantic. As a strategical point it has few rivals, being thoroughly fortified by substantial fortresses and favored as to natural advantages. The streets are improved by substantial pavements and sewerage, lighted by gas and electricity, and supplied with electric street railways. The manufactures include watches and clocks, leather goods, cutlery, cottons, woolen and silk fabrics, musical and scientific instruments, earthenware, tobacco products, jewelry, machinery, and ironware. The Minster Cathedral is a beautiful specimen of Gothic architecture and one of the most magnificent buildings in the world. It was founded in 1015 and has a spire 466 feet high. The cathedral is adorned with fine statues, a great rose window, and excellent specimens of paintings and frescoes.

Strassburg has a famous astronomical clock, completed by Isaac Habrecht in 1570, which ranks as the largest and most remarkable in the world. It is in the tower of the Minster Cathedral. Among the buildings of note are the palace, the Saint Thomas Church, the university, the city hall, and numerous educational, charitable, scientific, and religious institutions. The Kaiser Wilhelm University is the most celebrated of its educational institutions. It has 118 professors, 1,500 students, a fine laboratory, and a library of 850,000 volumes. The city has many beautiful gardens and parks, numerous monuments, and many charitable and benevolent institutions. The city was known as Argentosatum to the Romans, who are supposed to have founded it as a point of defense against the Germans, but the latter soon came in possession of it. It became a free city of Germany in the 13th century, but was ceded to France in 1681 by the Treaty of Ryswick. The Germans conducted a siege of seven weeks in the Franco-German War and on Sept. 28, 1870, the French capitulated. Considerable damage was done during the bombardment, but the city was rebuilt and greatly improved by the Germans. In 1919 it was annexed to France. Population, 1905, 167,678; in 1920, 178,290.

STRASSBURG CLOCK, the celebrated clock in the cathedral, or Minster, of Strassburg, France. It was first built in 1352 by John, then Bishop of Lichtenberg, and was replaced by an improved structure in 1570. The present clock was built by Charles Schwilgué in the early part of the 19th century. Although a few of the original movements were restored, the present mechanical works were designed by the builder. The base is 15 feet wide and the height is 30 feet. A winding stairs on one side permits going to the different stories. Opposite the stairway is a Gothic pillar, the panels of which are decorated with figure paintings. The base of the clock contains a globe of the heavens, which shows the rising, passing, and setting of all visible stars that appear over the meridian at Strassburg. A calendar, indicating the religious feasts and the days of the month, is immediately back of the globe. Apollo, represented by a life-sized figure, indicates the day of the month, and other astronomical events are shown by the calendar in the form of an annular band.

Figures drawn in chariots appear each day, immediately above the calendar, Apollo appearing on Sunday, Diana on Monday, Mars on Tuesday, Mercury on Wednesday, Jupiter on Thursday, Venus on Friday, and Saturn on Saturday. The time of day is indicated above these figures on the dial. Two figures, one on each side of the dial, are so constructed that one of these strikes the quarter hours and the other turns an hourglass every sixty minutes. A large planetarium is on the second story and the third story has a globe which shows the phases of the moon. Movable figures in the upper part strike the quarter hour. These figures represent four periods of life, those of infancy, youth, old age, and death, and above them is a figure of Christ. He is passed each day at noon by a procession of the Apostles. When Peter passes the Savior, a cock flaps its wings and crows three times, while Judas Iscariot, in passing, turns his face from the Master.

STRATFORD (străt'fĕrd), a city of Ontario, capital of Perth County, 87 miles west of Toronto. It is on the Avon River and has communication by six direct lines of the Canadian National Railroad, the shops of the latter being located here. The chief buildings include the county courthouse, the townhall, the Provincial Normal School, the public library, and several fine schools and churches. It has manufactures of boots and shoes, flour and grist, cordage, candy, biscuits, clothing, hardware, and farming machinery. It is a port of entry and carries a large trade. Population, 1921, 16,094

STRATFORD DE REDCLIFFE (străt'fĕrd dĕ rĕd'klĭf), **Sir Stratford Canning,** statesman and diplomatist, born in London, England, Nov. 4, 1786; died Aug. 14, 1880. He was a first cousin of George Canning, studied at Cambridge University, and in 1807 became secretary to his cousin, who had been appointed foreign minister. In 1808 he was made secretary at Constantinople and two years later became ambassador, in which capacity he negotiated a treaty between Turkey and Russia, thus releasing the Russian army in 1812 to oppose Napoleon in his Russian campaign. He was appointed minister to Switzerland in 1814, served as commissioner at the Vienna Congress of 1815, and from 1819 to 1823 was minister to the United States. In 1825 he was sent to Constantinople to promote the independence of Greece and six years later aided in fixing the boundaries of the new kingdom. He was ambassador at Constantinople from 1842 to 1858,

holding that position during the Crimean War, but in the latter year returned to London. His service there was the means of beginning numerous reforms, especially with regard to the liberties enjoyed by Christian citizens of Turkey and various industrial enterprises. He was raised to the peerage in 1852 and was created a Knight of the Garter in 1869. Besides publishing a number of poems, he wrote a play entitled "Alfred the Great in Athelny" and a work called "Why I Am a Christian."

STRATFORD-ON-AVON (ā'vŭn), a market town of England, situated in Warwickshire, eight miles southwest of Warwick, on the Avon River. It is noted as the birthplace of Shakespeare, and the house in which the famous writer was born is now preserved as the property of the government. The building is in a good state of preservation, but its external appearance has been much altered. The remains of Shakespeare were buried in the parish church and at the north wall are his monument and bust. Fully 20,000 visitors go to Stratford annually to visit the interesting places associated with the life of Shakespeare, this being the principal source of income to support the town. The visitors are shown the room in which he was born, the grammar school that he attended, and the theater erected in 1877 at a cost of $150,000, which occupies the site of the old theater used in the time of Shakespeare. Other objects of interest include an American stained glass representing the seven ages, now in the window of the old church, the Shakespeare fountain erected in 1887 by George W. Childs, and the cottage of Anne Hathaway. The town has good hotel and railroad accommodations for visitors, and the surrounding country is fertile and quite beautiful. Population, 1922, 10,685.

STRATHCONA AND MOUNT ROYAL, Donald Alexander Smith, statesman, born at Archieston, Scotland, in 1820. He emigrated to Canada and in 1838 entered the employ of the Hudson Bay Company. For some time he was stationed on the coast of Labrador and in the northwest, and was the last resident governor of that corporation as a governing body. During the Riel rebellion he was special commissioner and in 1870 was elected to the first session of the legislature in Manitoba. The following year he became a member of the Canadian House of Commons, where he was a factor in directing the attention of that body to the needs and possibilities of the Red River settlements. With the exception of the period of 1880 to 1887, he remained a member of the Dominion Parliament until 1896, when he became high commissioner for Canada to London. He was a promoter and director of numerous banking and railway corporations, chancellor of the University of Aberdeen, and did much to promote the development of the western part of Canada. Queen Victoria knighted him in 1886 and made him a peer in 1897, when he became Baron Strathcona and Mount Royal. He died Jan. 21, 1914.

LORD STRATHCONA.

STRATHCONA. See **Edmonton.**

STRATIFICATION (străt-ĭ-fĭ-kā'shŭn), in geology, the arrangement of certain rocks into parallel layers, or the state of being deposited in the form of strata. Originally the materials found in stratified rocks were loose substances, as clay or sand, and were deposited by the action of moving water. The common forms of stratification are found in shale, limestone, and sandstone, and these were formed in the beds of rivers and streams and on the shores of seas. In many instances the strata lie horizontally, but frequently they incline, when they are said to *dip*. They are either *conformable* or *unconformable,* depending upon whether their planes are parallel to each other. A group of one or more layers of the same mineral is a *stratum.*

STRAUS (strous), **Oscar Solomon,** public man, born at Atterberg, Germany, Dec. 23, 1850. He came with his parents to the United States in 1854 and resided in Georgia until after the Civil War. In 1871 he graduated from Columbia College, was admitted to the bar, and subsequently practiced law and followed a mercantile life. In 1887 he was appointed minister to Turkey by President Cleveland and in the campaign of 1896 became affiliated with the Republican party. President Roosevelt made him a member of the permanent court of arbitration at The Hague, in 1892, as successor to President Harrison. He succeeded Victor H. Metcalf as Secretary of the Department of Commerce and Labor in 1897. His books include "The Origin of the Republican Form of Government in the United States," "The Development of Religious Liberty in the United States," and "Reform in the Consular Service." He died May 3, 1926.

STRAUSS (strous), **David Frederich,** eminent author, born in Ludwigsburg, Germany, Jan. 27, 1808; died Feb. 8, 1874. After studying in his native town, he attended the theological seminaries of Blaubouren and Tübingen and in 1830 became a clergyman. Subsequently he spent six months in taking lectures under Hegel and Schleiermacher at the University of Berlin, and in 1832 became professor of philosophy at Tübingen. In 1835 he published his famous "Life of Jesus," in which he advanced the theory that the gospel history is a collection of myths gradually originated in Christian communities and later developed into an accepted historical truth. This work caused intense excitement in Germany and adjacent countries and

was subjected to many criticisms and investigations. Strauss was dismissed from his position in Tübingen and soon published numerous replies to his critics, the two most important being "Two Conciliatory Papers" and his "Publication of the Times." In 1839 he was made professor of dogmatic theology in Zurich and, being prevented from taking his place by reason of public opposition, he accepted a small pension. He devoted the remainder of his life to literary work, publishing many widely read addresses and treatises. His "Six Popular Addresses" were delivered in connection with the Revolution of 1848 and afterward were published in book form. Among the most noted of his later writings are "Review of Christian Doctrine," "The Old and the New Faith," "Christ of Faith," "The Romantics on the Throne of the Caesars," "Life of Schubert," "Lectures on Voltaire," "Life of Ulrich von Hutten," and "New Life of Jesus." His complete works were published in 1876.

STRAUSS, Johann, musical composer, born in Vienna, Austria, March 14, 1804; died there Sept. 25, 1849. He began to play the violin when a mere child and in 1819 secured an engagement as violinist at the Sperl Theater in Leopoldstadt. In 1826 he introduced his famous band to the public of Vienna and shortly after made an extended tour throughout Northern Europe, meeting with brilliant success in the principal cities. He visited Great Britain for an extended tour in 1849, but soon returned to Vienna and died of scarlet fever.

STRAUSS, Johann, composer, son of the former, born in Vienna, Austria, Oct. 25, 1825; died there June 3, 1899. He succeeded his father as manager of the famous Strauss orchestra, with which he traveled and gained fame in most of the countries of Europe. In 1872 he came to America to conduct an orchestra of 1,000 performers at the Boston Peace Jubilee, and while in the United States played with remarkable success in many of the principal cities. The fiftieth anniversary of his début in Vienna was celebrated with great pomp in 1894. He was for many years music director to the emperor at Vienna. Both he and his father take very high rank among the eminent German masters of music. Besides composing over 400 waltzes, he is the author of numerous operettas. The most popular of the latter include "Carnival in Rome," "Happy War," "A Night in Venedig," "Prince Methusalem," "Gypsy Baron," "Knight Pasman," "The Bat," "Cagliostro," "Jabuka," and the noted operetta, "Indigo."

STRAUSS, Richard, composer, born in Munich, Germany, in 1864. He began the study of music at a very early age, and when quite young had mastered the technics of the piano and violin. In 1885 he was made musical director at Meiningen and the following year received an important position at Munich, where he remained until 1889, when he was made a kapellmeister at Weimar. In 1894 he completed his musical drama entitled "Guntram," which caused notable interest. He was made kapellmeister at Berlin in 1898 and for many years took a leading part in directing the trend of music in Europe. His chief symphonic works include "Don Juan," "A Hero's Life," "Till Eulenspiegel," "Death of Apotheosis," "Don Quixote," and "Thus Spake Zarathustra." His tone poem, *Sinfonia domestica,* is greatly admired and his opera *Feuersnot* has been rendered in the principal cities of Europe.

STRAW, the term generally applied to the dry or ripened stalks of certain plants, such as wheat, barley, oats, rye, and buckwheat. It is used extensively as a food and bedding for animals after the grain has been threshed out, especially that of oats, and quite frequently for packing materials in making shipments. On the large farms in the western states it is quite impossible to consume all the straw in feeding and bedding animals, but the stacks in such cases are spread out considerably to receive the water from rains, thus converting them rapidly into manure, which is afterward used as fertilizer for the land. Straw is employed in the arts in making paper, hats, bonnets, baskets, rugs, and bags. The finer products, such as hats and bonnets, are made from straw cut before it is quite ripe. Wheat is the grain sown usually for that purpose, the seed being strewn thickly so as to produce fine-grained straws. It is cut by hand when ripe and carefully dried in the sun. After being bleached in the sun and dew, it is steamed and separated into different sizes, and is then woven by women and girls into tapelike braids. These are carefully flattened by pressure and sewn together to make hats and bonnets, colors being often alternated to give the product an artistic appearance.

Within recent years much progress has been made in the manufacture of goods from straw and the price has been materially lessened, owing largely to the invention of machinery of service in preparing the materials and sewing them together. Extensive manufactories for making straw-plait work are operated in the United States, particularly in Massachusetts. The principal enterprises of this kind in foreign countries are in northern Italy, Switzerland, Germany, France, and China. Bedfordshire has been the center of the British straw-plait industry for several centuries, owing to the favorable climate for producing straw of considerable strength and a fine, bright color. *Chip hats* closely resemble those manufactured of straw, but they are made by cutting the Lombardy poplar into splints and treating them quite like the straws of grain. To secure good results, it is necessary to bury the logs of this tree in dry ground for three years, thus removing the sap, and, after becoming dried, it assumes a reddish

color. Hats are made in Panama and several South American countries from palm tree leaves.

STRAWBERRY, a genus of plants extensively cultivated for their luscious fruit. They were so named from the practice of laying straw between the rows to keep the ground moist and free from weeds. The utility of putting straw between the rows consists in keeping the berries clean, and in the colder climates it furnishes a suitable protection against freezing in the winter. Strawberries are native to America and Europe, where they are distributed quite extensively as wild plants, and from these the principal cultivated species have been developed by propagation. The plants bear trifoliate leaves, usually white flowers on scapes, and slender runners by which they are propagated. They are mostly perennial and are propagated

VIRGINIAN STRAWBERRY.

by runners, by seeds, and by divisions of the plant. The fruit is highly valued for dessert and as such is eaten with sugar and cream. It is used extensively in making jam, for pies, and in preparing a flavor syrup.

The trade in strawberries has developed into a very extensive industry in Canada and the United States, the southern-grown being shipped to the northern regions, while in the latter the fruit ripens at a later time, thus making the strawberry season one of considerable length. A nice illustration is found in New York, which is first supplied with the strawberries grown in the southern states, next by those grown in New Jersey, and finally by securing quantities from New England. Among the species extensively cultivated are the *wood strawberry,* the *alpine strawberry,* the *Virginian strawberry,* and the *hautbois strawberry.* Many species have been developed from the wild and from seed of the cultivated varieties. Few fruits are held as highly in favor as well-grown strawberries.

STREATOR (strē'tẽr), a city of Illinois, in La Salle County, on the Vermilion River, 96 miles southwest of Chicago. It is on the Wabash, the Chicago and Alton, the Chicago, Burlington and Quincy, the Atchison, Topeka and Santa Fé, and the New York Central railway lines. The place is surrounded by an agricultural and coal-mining region. Among the principal buildings are the high school, the Y. M. C. A. building, the Carnegie library, and many schools and churches. The manufactures include flour, glass, earthenware, pop, tile, brick, and machinery. It has waterworks, sewerage, several parks, and a growing trade. The streets are lighted by electricity. They are substantially paved and traversed by street railways. It was settled in 1860 and incorporated as a city in 1882. Population, 1900, 14,079; in 1920, 14,779.

STREET, George Edmund, architect, born at Woodford, England, June 20, 1824; died Dec. 18, 1881. He studied architecture under Gilbert Scott and was appointed architect for the diocese of Oxford in 1850. His favorite style was the Gothic and he became a leader in reviving interest in this class of architecture. Among the principal buildings erected by him are the Church of Saint Margaret, Liverpool; the Jesus College Chapel, Cambridge; the Synod House, Dublin; and the Crimean Memorial Church, Constantinople. He won many prizes for making designs and received several decorations. His work entitled "Some Account of Gothic Architecture in Spain" contains an interesting review of the churches and cathedrals of the Iberian peninsula.

STREET RAILWAY, the general name of a railway operated entirely or in part upon the streets of towns or cities, designed principally to furnish intercommunication for passengers. This form of transportation was developed from the tramway, which is constructed of wooden stringers covered with strips of iron and the cars are drawn by horse or steam power. The first street railway of North America was built in New York City, in 1831, and extended from the Bowery to Harlem. It was known as the New York and Harlem Railroad and was operated as a horse-car line for many years. Though the cars were small and the speed was comparatively slow, it was pronounced a success and similar lines were soon constructed in Boston, Philadelphia, Berlin, Liverpool, and London.

Street railways operated by cable were first introduced at San Francisco in 1873, where they proved eminently satisfactory, owing to many of the streets having heavy grades. The motive power in railways of this kind is furnished by a stationary steam engine located at a central point and an endless wire cable, guided by suitable pulleys, is moved or driven at a rapid speed. This cable is in an underground conduit between the rails and a grip projects downward from the bottom of the car through a slot at the top. At the lower end of the grip are jaws

that can be operated from the platform of the car. When the jaws grasp the cable, the car moves forward upon the track and it is stopped by unloosing the jaws. Many of the larger cities installed systems of cable cars, but they are now used only where the streets have steep grades, as in Seattle and San Francisco, and to make ascent of mountains, as is the case at Mount Washington.

Electric railroads were first constructed in Berlin, Germany, in 1879. They are the most popular and serviceable of all the systems and have largely displaced horse-car lines and cable railways. They do not only traverse the streets of the principal cities, but connecting lines are maintained and operated successfully in interurban and rural districts. In 1925 there were 47,658 miles of electric railways in operation in the United States. Although they were confined to no particular part of the country, Ohio, Pennsylvania, and New York had the largest mileage, the amount in these states being 4,023, 4,646, and 5,428 miles, respectively. In the same year Canada had 3,990 and Cuba had 475 miles.

STRENGTH OF MATERIALS, the resistance which materials offer to forces that tend to change their form. This property is frequently spoken of as the elasticity and resistance of materials and, in sciences, the strength of material is sometimes designated the *mechanics of materials.* The materials used in construction possess more or less elastic properties and spring back to their original form when the forces are removed, provided the applied forces are not so great as to cause breakage. The internal resistance that balances a structure is called a *stress,* and such temporary changes as compression, elongation, and twisting are designated *strains.* It is an established rule in engineering that the strain on materials should not exceed the elastic limit, which is a point beyond which the change of form increases to an extent greater than the force applied, and unless the force is lightened or relieved rupture results. When stresses tend to cut across a body they are said to be *shearing,* when they tend to pull it apart they are known as *tensile,* and when they operate to crush it they are designated *compressive.* Tortional stresses tend to twist a shaft and flexural stresses operate to bend, but both classes may be resolved into the three simple classes.

Changes in architecture and engineering constructions have directed attention to the study of the strength of materials. It is important to the designer of a machine or structure of any kind to know the degree of force that may be applied safely, whether the strain will be sufficiently moderate that the material will recover from it, and to what extent force may be exercised without endangering material to rupture or breakage. Besides determining what class and amount of material is necessary to carry the loads, it is an item of importance to determine what is the least quantity and most serviceable kind of material that may be put into the structure. Architects and designers cannot determine these essentials by experiments as a structure is under way, but it is necessary to know what loads and forces are to be carried as well as to understand the size and kinds of materials to be used before the work of construction has commenced.

Many machines have been patented for testing materials to determine their degree of resistance. These machines differ greatly in form and method of applying force, ranging from the most delicate used in testing the finer material utilized in instruments to the heavier grades employed in measuring the strength of large and bulky objects. Bending, stretching, crushing, tension, and shearing are the common tests. Testing by tension to determine the elastic limit, maximum strength, ultimate elongation, and contraction of area is used most extensively. Before testing a given specimen, marks are made at regular intervals and measurements are taken between them, both before and after the test, and the data for computing the changes, if any, are carefully preserved. In form testing, the apparatus differs widely, but it may be generally classified under the two forms of screw machines and hydraulic machines, so called from the methods of applying the power, which in the former is by screw and wheel and in the latter by pressure transmitted through oil by means of a pump. The testing machine designed by A. H. Emery for the United States government and used at the Watertown arsenal is considered the most precise in the world. It has a capacity of 1,000,000 pounds, is extremely sensitive, and yet has the power to break a bar thirty feet long.

In studying the theory of resistance of materials we have to do with beams, shafts, and columns, all of which are dealt with in construction work. The particular forms as well as the quantity of material used depend of course upon the force to be applied and the manner in which the force acts. In buildings the stresses are steady, hence the materials offer greater resistance to forces, while in bridges and machinery the stresses vary and the structures are subject to shocks. It is estimated that the ratio of ultimate strength in timber withstanding steady strains is as 8 against 10 for varying strains and 15 for shocks. In steel the ratio for steady strains is as 5 to 7 for varying strains and 15 for shocks, while in brick and stone it is as 15 in steady strains to 25 in varying strains and 30 for shocks.

The greatest resistance to tensile strains is offered by wrought iron and steel, and wood deflects to a greater degree under a given weight than iron or steel, owing to its having a greater elastic range of action. Strength in wood depends largely upon its weight, the

heavier kind being generally the stronger. Cast iron is employed extensively in the construction of bridges and foundations, owing to its ability to resist a great degree of compression. To minimize the consumption of material as well as decrease weight and increase stiffness, much material in hollow forms is employed. The utility of this is illustrated by the hollow construction of the bones of animals and many grasses. Engineers have developed formulas for calculating strength against stresses and have classed quite correctly the strains of materials, such as wood, stone, and metals.

STRIKE, an organized effort made by workingmen to obtain concessions from their employers concerning wages and other matters. It consists of a refusal to work unless the demands are granted. In a thoroughly organized strike the capital of the employer lies idle, usually at a considerable loss. This condition continues until a compromise is effected or other workingmen are secured. A *lockout* is a retaliatory measure sometimes resorted to by the employer, and is designed to induce the workmen to return to their employment, or as a notice to indicate that workmen are wanted who have not been implicated in the strike.

In the period extending from 1881 to 1900 there were 22,793 strikes in the United States, of which 14,457 were ordered by organizations and 8,326 took place by general agreement of the laborers. Fifty-three per cent. of those ordered succeeded, while 14 per cent. were partly successful, and the remaining 33 per cent. failed. On the other hand, of those not ordered, 36 per cent. succeeded, 9 per cent. partly succeeded, and 55 per cent. failed. The experience of the past twenty years has shown uniformly that the success of a strike depends almost entirely upon close organization of the laborers directly interested. To counteract the effect of concerted action by laborers, capital has become closely organized in all departments of the productive industries. This has had the effect of greatly prolonging strikes in which large interests are involved, such as the great anthracite coal strike of 1902, which continued about five months and cost the country $142,500,000 by losses in business. Those having charge of organization work, both for the labor unions and operators, were confronted by a prospective strike of the miners in 1905, but the questions involved were left over to be settled in 1906. General strikes like those of Italy in 1914 are unknown in Canada and the United States.

Strikes were illegal in Great Britain until 1824 and prior to that time the participants were punished for conspiracy. However, since then many strikes have occurred each year. In 1912 Great Britain and Ireland had 485 industrial disputes, most of which involved the shipyards, textile factories, and metal workers. In the same year Germany had 3,245 strikes. They have been practically unknown in Australasia since 1894, since which time the law has required arbitration in all industrial disputes.

The following is a table giving the number of strikes and lockouts in the United States in the period of twenty years, from 1891 until 1922 inclusive:

	STRIKES.		LOCKOUTS.	
	NUMBER.	LABORERS IDLE.	NUMBER.	LABORERS IDLE.
1891	1,717	298,939	69	31,014
1892	1,298	206,671	61	32,014
1893	1,305	265,914	70	21,842
1894	1,349	660,425	55	29,619
1895	1,215	392,403	40	14,785
1896	1,026	421,170	40	7,668
1897	1,078	408,391	32	7,763
1898	1,056	249,002	42	14,217
1899	1,797	417,072	41	14,817
1900	1,779	505,066	60	62,653
1922	1,870	862,500	72	75,640

STROBEL (strō'b'l), **Edward Henry,** public man, born at Charleston, S. C., Dec. 7, 1855; died Jan. 15, 1908. He was educated in the public schools of his native State and at Harvard University, and in 1885 became secretary of the United States legation at Madrid. In 1888 he was made special diplomatic agent of the United States to Morocco, served for some time as chargé d'affaires at Madrid, and returned to the United States in 1893 to become third Assistant Secretary of State. President Cleveland made him United States minister to Ecuador in 1894 and the following year transferred him to Chile, where he served efficiently until 1897. He was an arbitrator in a dispute between Chile and France in 1897, became Bemis professor of international law in the Harvard Law School, and in 1899 was counsel for Chile before the claims commission of Chile and the United States. The government of Siam selected him as general adviser in 1903. Besides contributing to periodical literature, he published "The Spanish Revolution."

STROBOSCOPE (strŏb'ō-skōp), an instrument for viewing a moving object by intermittent sight. The principle is explained by a cardboard cylinder perforated near the circumference with a series of openings, and the body is viewed through these perforations while the disc rotates uniformly. If the apparatus is caused to revolve, the series of views within the cylinder may be viewed with much the same effect as that produced by moving pictures. The kinetoscope and the vibroscope were evolved from the stroboscope, and in modified form it has given rise to the invention of numerous toys for children. See **Kinetoscope.**

STROMBUS (strŏm'bŭs), the name of the shells of various mollusks, all of which have a more or less conic spire. These shells are found on a number of species of gastropod mollusks. The largest, known as the fountain shell, weighs from four to five pounds. It is used in making cameos and certain porcelain work.

STRONTIUM (strŏn'shĭ-ŭm), a metallic

element belonging to the alkaline earths. It has a pale yellow color, decomposes in water, and burns with a crimson flame. In nature it is found in various combinations, but is closely associated with barium and calcium. It occurs in the ashes of certain plants and in sea and mineral waters. The chief use is in making fireworks, since it burns with a bright red flame.

STRUVE (strōō'vę), **Friedrich Georg Wilhelm von,** astronomer, born at Altona, Germany, April 15, 1793; died Nov. 23, 1864. He studied in the University of Dorpat, in Russia, and in 1839 was made the director of the observatory at Poltava, near Saint Petersburg. While serving in this capacity he made many researches concerning double stars and conducted a number of geodetic operations. His works on astronomical subjects are numerous, especially those that relate to double stars and the nature of the Milky Way.

STRYCHNINE (strĭk'nĭn), an extremely poisonous compound, which is derived from several species of the *strychnos nux vomica* trees or shrubs. These plants are native to tropical regions. They are of the order *Loganiacæ,* having opposite leaves and dense, aggregated clusters of white, bell-shaped flowers. They occur in the tropical parts of America and Asia and yield, besides strychnine, brucine and other powerful drugs. Strychnine is a white, crystalline compound and in small doses is a stimulant, but when administered in larger quantities is a powerful poison and causes tetanic spasms. It has been in use since 1818, when it was discovered in Saint Ignatius' beans. See **Poison.**

STUART (stū'ĕrt), or **Stewart,** a royal family of Scotland and England, so named from the office of steward of Scotland. It appears that the house was founded at the time of David I. of Scotland, who made Walter, the son of a Norman baron, the steward of his household, and afterward the name of Steward became attached to his family. It was written in this form until Mary, Queen of Scots, went to France, when the form of Stuart was adopted by her and afterward retained by her descendants. Walter, the sixth steward of Scotland, married Marjory, the daughter of King Robert I., in 1315, and by this union the crown of Scotland became vested in his family in case the royal line would otherwise become extinct. Robert, son of Walter, became the seventh steward and, as David II. died without issue, he succeeded to the throne of Scotland in 1371 as Robert II. Fourteen Stuarts occupied the Scottish throne between 1371 and 1714, and six of that house became sovereigns of England. Queen Anne was the last Stuart to occupy the throne of England and was succeeded by the Hanover dynasty, of which the present royal family of England is a representative. The connection between the Stuart and Hanover families is through Sophia, electress of Hanover, Germany, who was the granddaughter of James VI.

STUART, Charles Edward. See **Charles Edward.**

STUART, Gilbert Charles, portrait painter, born in Narragansett, R. I., Dec. 3, 1755; died in Boston, Mass., July 27, 1828. He became interested in drawing sketches when a boy at school and subsequently studied painting at Edinburgh, Scotland. His benefactor, named Cosmo Alexander, died while Stuart was in Scotland and he was compelled to work his way home in a ship. He went to England in 1775, where he became a pupil of Benjamin West, and in 1785 set up a studio of his own. By perseverance and natural talent he attained a high rank among English painters and in 1792 returned to America. His work was mostly at Philadelphia until 1804, when he established a studio in Washington, and two years later removed to Boston. Three portraits of Washington are among his most celebrated productions and these have been engraved fully 250 times. Other well-known portrait paintings include those of John Adams, Jefferson, and Madison.

STUART, James Edward, public man, born in England in 1688; died in 1766. He was a son of James II. of England and his second wife, Mary Beatrice, and was involved in the exclusion of his father from the throne. The Jacobites undertook to place him on the throne by force of arms in 1715, but the rising was soon put down and Prince James, as he was generally called, escaped to France. Later he removed to Rome, where he resided much of the time, and in 1819 married a granddaughter of John Sobieski, King of Poland. Charles Edward, the Young Pretender, was a son of Prince James.

STUART, James Ewell Brown, soldier, born in Patrick County, Virginia, Feb. 6, 1833; died in Richmond, Va., June 12, 1864. After graduating from the United States Military Academy, in 1854, he served in the cavalry stationed in Texas and Kansas, and at the beginning of the Civil War resigned his command to enter the Confederate cavalry in Virginia. Among the principal battles in which he took an efficient part are those of Bull Run, Antietam, Fredericksburg, and Gettysburg. Subsequently he was made major general and had command of the cavalry under Lee, and in that capacity rendered gallant service in the battles of the Wilderness. He was mortally wounded at Yellow Tavern, where he attempted to check Sheridan's advance, and died soon after. A fine equestrian monument has been erected to his honor on Monument Avenue in Richmond, Va., inscribed with the words of General Lee, "To his comrades in arms he has left the proud recollection of his deeds and the inspiring influence of his example."

STUART, Moses, clergyman and classical

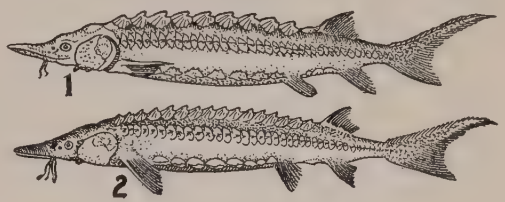
scholar, born in Wilton, Conn., March 26, 1780; died Jan. 4, 1852. He graduated from Yale and later studied law, but soon abandoned that profession for theology. In 1806 he was made pastor of a Congregational church at New Haven and in 1810 became professor of sacred literature at Andover, which chair he held with marked success for 38 years. His first publication was a Hebrew grammar, the type for which he was compelled to set himself, owing to the lack of competent compositors. Among his writings are "Grammar of the New Testament Dialect," "Conscience and the Constitution," "Hints on the Interpretation of Prophecy," "Commentary on the Epistle to the Romans," and "Elements of Interpretation."

STUART, Ruth McEnery, author, born in Avoyelles Parish, Louisiana, May 21, 1849. She received a limited education, owing to the unfavorable influence of the Civil War, and in 1879 she married Alfred O. Stuart, a planter of Arkansas. In 1888 she began to contribute to a number of magazines, including the *Century* and *Harper's Magazine*. Her writings show deep thought on a wide range of subjects. They include "The Story of Babette," "Holly and Pizen," "The Woman's Exchange," "George Washington Jones," and "The Second Wooing of Salina Sue." She died May 4, 1917.

STUBBS, William, bishop and historian, born in Knaresborough, England, June 21, 1825; died April 22, 1901. After attending the Ripon grammar school, he entered Oxford University, graduating from the latter with high honors in 1848. He was shortly after elected a fellow at Trinity College and two years later became a clergyman at Navestock. In 1866 he was selected as professor of modern history at Oxford, became bishop of Chester in 1884, and five years later was transferred to the see of Oxford. An exhaustive and industrious student, he attained to a wide influence as a lecturer and historical writer. Among his writings are "Lectures on the Study of Mediaeval and Modern History," "Select Charters and Other Illustrations of English Constitutional History," and "Early Plantagenets." He edited a large number of important works, including Mosheim's "Institute of Ecclesiastical History," Roger de Hovedon's "Chronicles," "Historical Works of Gervase of Canterbury," "Chronicles of the Reigns of Edward I. and Edward II.," and "Memorials of Saint Dunstan."

STUCCO (stŭk'kō), a kind of plaster prepared of a mixture of a ground chalk, or marble, with pure lime as a cement, in such proportions and so worked as to procure a durable and uniform surface susceptible of polish. It is used for covering walls and for making internal decorations, and a mixture of coarser material with cement is employed for external work. Sometimes pulverized alabaster or gypsum is used instead of marble, mixed with rich lime, carefully slaked and sifted, and then troweled on a rough coat until the surface is perfectly smooth. Other varieties are made of plaster of Paris, mixed with a saturated solution of alum or sulphate of potash, then dried in air and baked at a dull red heat. This preparation is pulverized and sifted and is then slaked with a solution of alum. Several kinds of stucco were used by the Greeks and Romans for decorating public buildings, both internally and externally.

STURGEON (stûr'jŭn), a genus of ganoid fishes, having five rows of bony shields and four barbels in a transverse row before the small, tubeless mouth. The snout is long and pointed, the body is elongated, and the eyes and nostrils are on the sides of the head. The gill covers are large, the fins are well developed, and the snout is covered with bony plates. In the spring they ascend the rivers to spawn and return to the sea in the autumn. The species which are common to the fresh-water lakes do not descend to the sea to spawn. Many species have been described. They vary in size and somewhat in general characteristics, but the flesh of nearly all is edible, both in the fresh and salted forms. A kind of pressed and salted food called *caviare* is made of the roe, and a fine grade of isinglass is obtained from the air bladder.



1, Common Sturgeon; 2, White Sturgeon.

Sturgeons are mostly sea fish, but are found in large numbers in the bays and larger rivers. Important sturgeon fisheries occur both off the Atlantic and Pacific coasts of North America, and a fresh-water species is common to the Great Lakes, where it is caught in large quantities. The *common sturgeon* of America and Europe is from six to twelve feet long. A familiar species of the Gulf of Mexico, the *shovelnose,* is peculiar for its prolonged snout. The most important sturgeon fisheries of Europe are in the Caspian and Black seas, where the *white sturgeon* is found in abundance. It attains a length of 20 to 25 feet and a weight of 3,000 pounds. It yields most of the isinglass and caviare of the market. The *sterlet* is found in the Volga and Danube and is seldom more than three feet in length, but is noted for its delicate flesh. Lake Baikal, in Siberia, has important sturgeon fisheries.

STURGIS (stûr'jĭs), **Russell,** architect and author, born in Baltimore, Md., Oct. 16, 1836. He first studied architecture in New York City and subsequently in Europe, and from 1865 until 1880 practiced his profession. Among the

buildings designed by him are Lawrence Hall of Yale University, the Homeopathic Medical College, and the Flower Hospital, in New York City. He was made professor of architecture and the art of designs in the College of the City of New York in 1878, but on account of ill health resigned after two years and traveled extensively. In 1885 he was editor of decorative art and mediaeval archaeology of the *Century Dictionary,* and subsequently edited the department of fine arts in *Webster's International Dictionary.* Besides contributing to periodical literature he edited the *Dictionary of Architecture and Building.* Among his publications are "Annotated Bibliography of Fine Arts," "Manual of the Jarves Collection of Early Italian Pictures," "European Architecture," and "How to Judge Architecture." He died Feb. 11, 1909.

STURM (stŏŏrm), **Johannes von,** educator, born at Schleiden, Germany, Oct. 1, 1507; died March 3, 1589. He studied in Leyden and Louvain and in 1537 founded the Gymnasium of Strassburg, of which he was principal until 1580. This institution acquired a wide reputation under his administration and was ultimately converted into a university. His system of education exerted great influence throughout Germany, owing to the fact that he was liberal in religious opinions and promoted the Lutheran faith, which was generally adopted in Prussia at that time. His system of organizing educational work was made the basis of the institutions at Eton and Rugby, England, and it may be justly considered the origin of the modern graded school system.

STUTTGART (stŭt'gärt), a city in Germany, capital of the kingdom of Württemberg, 115 miles northwest of Munich. It is beautifully situated on the Neckar River. The surrounding hills are covered with orchards, gardens, and vineyards. The streets of the newer part are broad and the buildings are handsome, but the older section has many structures which date from an early period. It has gas and electric lighting, electric urban and suburban street railways, systems of sewerage and waterworks, and beautiful gardens and parks. Königsstrasse, a beautiful and spacious thoroughfare, extends diagonally from southwest to northeast through the city. Among the manufactures are cotton and woolen fabrics, jewelry, chemicals, machinery, musical instruments, furniture, and confectionery. It has an extensive domestic and foreign trade, the latter being largely with the United States and European ports.

Stuttgart is well built of stone and brick. Near the center of the city is the royal palace, which is surrounded by a royal park, whose walks are free to the public. The cathedral dates from the 15th century. Other buildings of note include the government mint, the royal theater, the museum of arts, the palace of justice, the polytechnic school, the conservatory of music, the city hall, and the union railroad station. The royal library has 550,000 volumes, with which are included 9,000 Bibles in 80 languages and 2,500 specimens of early printing. The city has a remarkably large book trade and publications issued here are sent to all parts of the world. Among its notable monuments are those of King William and Schiller, the latter by Thorwaldsen. The first mention of Stuttgart occurs in 1229. It was made the residence of the counts of Württemberg in 1320 and has been the royal residence almost without intermission. The importance of the city as a commercial city dates from the Franco-German War. Population, 1905, 249,286; in 1920, 285,589.

STUYVESANT (stī'vẹ-sạnt), **Peter,** director-general of the New Netherlands, born in Holland in 1602; died in New York City in 1682. After engaging in the military service of Holland in the West Indies, he was made governor of Curaçoa, and while leading an attack on Saint Martin he lost a leg. The Dutch West India Company made him director-general of the region included in New York, which was then called the New Netherlands, where he arrived in 1647. His policy toward the Indians was conciliatory. He established a court of justice, organized a general assembly of eighteen delegates, and from the latter selected an advisory council to assist in the government. In 1650 he joined the English commissioners at Hartford to assist in establishing the boundary between the Dutch and English possessions, and five years later annexed the Swedish settlement on the Delaware. Charles II. of England, in 1664, granted the Duke of York, afterward James II., the territory lying between the Connecticut River and the Delaware and in the same year four English warships made a forcible demand for the surrender of New Amsterdam. Resistance being fruitless, the municipal authorities yielded and on Sept. 9, 1664, concluded a treaty at the farmhouse of Stuyvesant. This farm was known as the *Bouwerij,* from which the Bowery in New York was named. The name of New Amsterdam was changed to New York in honor of the Duke of York. Stuyvesant lived on his farm eighteen years after his surrender and his remains were buried in New York City, at the place where Saint Mark's Church now stands, and an inscription is in the eastern wall of the church. He is described humorously by Washington Irving in his "Knickerbocker's History of New York."

PETER STUYVESANT.

STYLITES (stī'līts), or **Pillar Saints, a**

class of Christian saints of the early church, who occupied lofty pillars as an evidence of penance. This practice was indulged in to realize the two fundamental ideas of Christianity, separation from the things common to this world and aspiration after those of heaven. The pillars were high columns with a platform above, so limited that the occupants were obliged to stand continually in the open sky, and were protected only at the sides by a railing. Simeon the Syrian (390-459 A. D.) was the first Stylite, and commenced the practice at Antioch in 420, where he spent thirty years on a pillar having a top four feet square. The pillar was only 10 feet high when he began this practice, but it was afterward increased to 36 and later to 72 feet. His life was one of great austerity, but it is evident that he descended at times, since it is mentioned that he wrote epistles and cured the sick by his touch. After his death the Stylites became numerous and the practice continued down to the 12th century, when it was forbidden.

STYPTIC (stĭp'tĭk), a remedy employed in surgery to check the flow of blood, as in treating a wound. Formerly alum and tannin were used extensively as styptics, but they have been displaced by other agencies, since they are inclined to cause unclean clots or produce secondary hemorrhage. Capillary bleeding is arrested by cold or by cautery. The vegetable styptics used at present include turpentine, oak bark decoction, and gallnuts in the form of powder or an infusion. Among the mineral styptics are the nitrate of silver and the sulphates of zinc and copper.

STYX (stĭks), in Greek mythology, a river of the lower regions, which flowed around Hades seven times. Across this stream the shades of the departed were conveyed by Charon, an unshaven boatman. It was so named from Styx, the daughter of Oceanus, who dwelt in a grotto at the entrance of Hades and confirmed the solemn oath of the gods. The sea goddess Thetis dipped her son Achilles in the River Styx and thereby rendered him invulnerable, except in the right heel, by which she held him.

SUAKIM (swä'kĕm), or **Suakin,** a town and seaport of Egypt, on an island in the Red Sea, connected with the mainland by a railroad bridge. It is about 630 miles northwest of the Strait of Bab-el-Mandeb and is a favorite place for Mohammedans to embark in traveling to Mecca. Formerly it was of considerable importance for its commerce, but its trade has declined considerably with the construction of railroads and the improvement of the Nile. It has manufactures of cutlery, clothing, jewelry, and small arms. The trade is chiefly in gums, ivory, and tobacco. The Turks founded Suakim. It became a British possession in 1882 and is the residence of a number of officials. Population, 1916, 12,500.

SUBLIMATION (sŭb-lĭ-mā'shŭn), a process of distillation in which the vapors condense in a solid form. In this process solid substances are converted into vapor through the agency of heat and on cooling again assume a solid form, when the resulting substance is called a *sublimate.* It takes place naturally in the fissures and craters of volcanoes and the products of a sulphurous character are deposited upon the walls. The number of mineral substances that vaporize by heat and become solid again on cooling are numerous, and the number of such increases with the degree of heat that is applied. Camphor, benzoic acid, and other vegetable substances possess the same property. Sublimation is employed in the arts and manufactures as a means of separating volatile from fixed bodies, usually for obtaining the former in a purer state. Some sublimates assume a solid and compact form, such as camphor and the sublimates of mercury, while others form a fine powder, called *flowers,* as the flowers of sulphur. In some cases the vapor is changed chemically by contact with the oxygen of the air, when the sublimate is of a different composition from the original body, as when oxide of zinc is produced by subjecting the metal, or its ores, to heat exposed to the air.

SUBMARINE NAVIGATION (sŭb-mà-rēn' năv-ĭ-gā'shŭn). See **Torpedo Boat.**

SUCCESSION WAR (sŭk-sĕsh'ŭn), the general name given to an armed conflict resulting from rival claims of succession to the throne. Four of such wars are historical, since they disturbed the peace of Europe and were accompanied by great loss of life and property. These wars rose from the conflicting claims to the thrones of four countries, those of Spain, Poland, Austria, and Bavaria, in the order named.

The War of the Spanish Succession began in 1701, after the death of Charles II., who died childless. Louis XIV. of France, son of the eldest sister of Philip IV., and Emperor Leopold I. of Austria, son of a younger sister of Philip IV., were the principal claimants to the throne. Fearing that the union of Spain with Austria or France would disturb the balance of power in Europe, other nations became interested in the conflict. Leopold transferred his claims to his second son, the Archduke Charles, and a majority in Spain favored the Austrian party, but Louis nominated Philip of Anjou, his grandson, and the latter was recognized as the heir. He proceeded to Spain shortly after the death of King Charles and was recognized as monarch, in 1700, and Leopold immediately sent an army to Italy under Prince Eugene, who defeated a French army at Chiari the following year. Louis XIV. unwisely recognized James Edward Stuart, the Pretender, and this caused William III. of England to enter an alliance with Holland and

Austria against France. However, Bavaria and some of the other German states joined the Bourbons of France and Spain. Queen Anne succeeded to the English throne in 1702 and continued the policy of William by declaring war.

Marlborough, with an allied army of Dutch, English, and Germans, in 1702, invaded the Spanish Netherlands. At the same time the Margrave of Baden invaded France, but was defeated by Villars. The armies under Eugene and Marlborough were united, in 1704, and at Blenheim defeated the Franco-Bavarian army under Tallard. About the same time the English captured Gibraltar and Barcelona. In 1706 the French and Bavarians under Villeroi were defeated at Ramillies by Marlborough, and Eugene won a brilliant victory over the French under Marsin at Turin. Archduke Charles had previously, in 1704, invaded Spain by crossing Portugal from Lisbon, and the Bourbon forces were driven across the Pyrenees, to which Peterborough with an English army contributed materially. In the Netherlands, at Oudenarde, in 1708, Eugene and Marlborough defeated a large army of Bourbons, and the following year they gained a victory over Villars at Malplaquet.

An armistice was concluded between England and France in 1712, but Eugene, aided by Holland, carried on the war. Prussia, Holland, England, and Savoy agreed to the Peace of Utrecht, in 1713, and the war closed the following year with the Treaty of Baden. Philip was left in possession of the throne of Spain; Gibraltar and Minorca were ceded to England, which received Arcadia from France; Austria received Naples, Sardinia, the Duchy of Milan, and the Spanish Netherlands; Savoy received Sicily; and it was agreed that the crowns of France and Spain should not be united in the same person. Queen Anne's War is the name applied in America to the conflict between the French and English as a part of the War of the Spanish Succession.

The War of the Polish Succession began in 1733, immediately following the death of Augustus II. of Poland and Saxony. Stanislas Leszczynski was elected king by the diet, but the nobles preferred Augustus, son of the late king, who was supported by Austria and Russia. Stanislas was supported by France, which country declared war upon Austria and invaded Lorraine. In the meantime Sardinia took up arms against Austria and Spain undertook the conquest of the Two Sicilies, which it had lost by the War of Spanish Succession. The Austrians were defeated at Bitonto in 1734 and were compelled to relinquish the Two Sicilies. Augustus III. was made King of Poland, but the duchies of Lorraine and Bar were assigned to Stanislas for life.

The War of the Austrian Succession began in 1740, after the death of Charles VI. Maria Theresa ascended the throne with the support of most of the powers, but Frederick the Great seized Silesia, while Charles Albert of Bavaria claimed the throne of Austria as a descendant from Ferdinand I. The latter was crowned emperor in 1742 as Charles VI., and was supported by Prussia, France, Bavaria, Spain, Saxony, Sardinia, and Naples. Maria Theresa had the united support of Austria, Hungary, England, and Holland. The policy of France to gain unusual advantages caused Frederick to become displeased and as a result Saxony and Prussia concluded the Peace of Dresden with Austria, thus terminating the second Silesian War. Marshal Saxe gained substantial victories in the Austrian Netherlands, where he defeated the allied army of English, Dutch, and Austrians. Charles VII. died in 1745 and his son, Maximilian Joseph, relinquished his claim to the throne of Austria and concluded peace. Francis I., the husband of Maria Theresa, was elected emperor in the same year. Marshal Saxe won several successes against the Austrians, but peace was finally concluded at Aix-la-Chapelle in 1748. By the terms of this treaty the Hapsburgs lost Silesia, which became a part of Prussia. Spain received Parma and Piacenza. In America this contest is known as King George's War, during which the French lost Louisburg, in 1745.

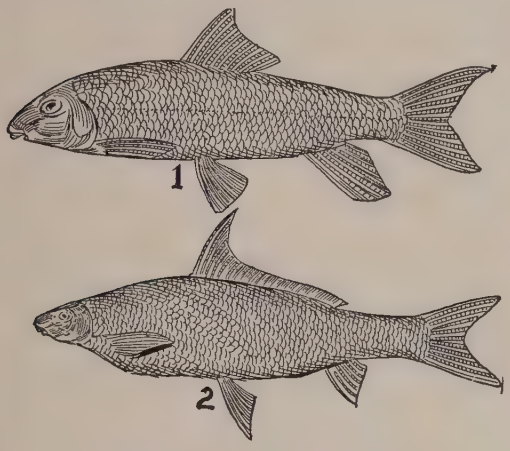
The War of the Bavarian Succession followed the death of Maximilian Joseph of Bavaria, in 1777. Having no legitimate heirs, Charles Theodore of the house of Wittelsbach claimed the throne. He was supported by Joseph II. of Austria, but was opposed by Frederick the Great, who declared war and invaded Bohemia. Saxony supported Prussia. Catharine II. of Russia was hostile to Austria, which induced Maria Theresa to conclude the Treaty of Teschen in 1779. As a result of this treaty the crown of Bavaria passed to Charles Theodore, while Saxony received a money indemnity, and Austria was given a small district on the east side of the Inn.

SUCHAU. See **Soochow.**

SUCKER, a genus of soft-rayed fishes of the carp family, having the mouth usually protractile, with thick and fleshy lips adapted for sucking in food. About thirty species are found in the fresh waters of America, of which the *common sucker* is the most abundant. It attains a length of twelve to eighteen inches and, like other species of suckers, is hard to catch with a hook, owing to its difficulty in taking bait. The *buffalo sucker* is two to three feet long and is found in the large rivers of the Mississippi valley. These fishes are somewhat bony, but quite well flavored. They are caught mostly with nets. The largest of the genus is the *Missouri sucker*, which is from two to four feet long. See illustration on following page.

SUCRE (sōō'krā), or **Chuquisaca**, the capital of Bolivia, situated on a tableland 8,975 feet

above the sea, 125 miles southeast of Lake Poopo Choro. The streets are regularly platted and well improved by grading and paving. Among the noteworthy buildings are the cathedral, the national university, the school of industrial arts, and several colleges of arts and sciences. The city was founded by Pedro Auzures, an officer of Pizarro, in 1538. It occupies the site of an Incas town called Choque Chaka, meaning bridge of gold. The surrounding country contains valuable deposits of silver and other minerals, but the most noteworthy mines are those producing silver ores. It has a considerable inland trade and manufactures of clothing, furniture, hardware, jewelry, and machinery. The Pilcomayo River has its source in the vicinity of the city, and in the region of its headwaters are valuable forests and soil of considerable fertility. The inhabitants are mostly of Spanish extraction, but a considerable portion of the people are Indians. Population, 1922, 40,500.



SUCKER.

1, Common Sucker; 2 Missouri Sucker.

SUDAN (sōō-dän′), or **Soudan,** the Arabic name of a vast region in Central Africa. It is bounded on the north by the Sahara Desert, east by Egypt and Abyssinia, south by the Congo Free State, Cameroon, and Upper Guinea, and west by Senegambia. The Sudan has an area of about 2,500,000 square miles and a population variously estimated from 15,000,000 to 80,000,000. The inhabitants are mainly of Negro blood, differing in stature and habits and slightly in color, according to the region occupied. They are classed mainly as to location in the three general divisions known as Western, Central, and Eastern Sudan. In *Western Sudan* the French have obtained the predominating influence, chiefly by moving eastward from Senegambia. This region includes a large part of the Niger and Senegal valleys and is divided into a number of native states, but all are now more or less tributary to the French.

Central Sudan embraces the northern part of the Niger Territories, Cameroon, and French Congo, and the regions tributary to Lake Tchad. The drainage is almost exclusively into Lake Tchad, which has no outlet to the sea, but a portion of the southern region is drained into the Niger and Congo rivers. *Eastern Sudan,* often called the Egyptian Sudan, includes the divisions known as Darfur, Kordofan, Senaar, and several others, thus including a part of the upper Nile region and the towns of Khartoum and Fashoda. The Sudan region may be described as being moderately elevated and diversified by rolling plains, level plateaus, and somewhat elevated highlands in the southwest. In the northern part are many sandy wastes extending from the Sahara, but there is a gradual transition to the well-watered and arable interior, and the height of fertility is reached in the vicinity of 10° north latitude.

The distribution of plant and animal life in the Sudan is greatly varied, owing to vast difference in the soil, climate, and distribution of moisture. Among the principal productions are corn, sugar, tobacco, rice, cotton, indigo, and many kinds of fruits. Cattle, horses, sheep, camels, and goats are reared in many sections, especially by the people of Arabic extraction. Honey made by wild bees forms an important article of commerce. Ostrich feathers, ivory, rubber, palm oil, wax, iron, gold, silver, gums, salt, timber, and building stone are obtained in abundance. In many sections large herds of wild animals are met with, especially elephants in the swamp regions of Lake Tchad, the rhinoceros in the Wadai, crocodiles in the large rivers, and the zebra, antelope, giraffe, and wild ass in the eastern steppes. In some regions are vast numbers of hippopotami, monkeys, serpents, birds of song and plumage, and fish.

A large part of the Sudan is still under government by native chiefs, but within recent years the French, Germans, Portuguese, and English have established protectorates or annexed different tracts to their colonial possessions. Portuguese influence has been manifest largely through the Congo Free State, English through Egypt and the Niger Territories, German from Cameroon, and French from Senegambia. Trade stations have been established in all the sections tributary to water courses, or caravan routes, and railroad building has made material progress.

SUDERMANN (zōō′dĕr-män), **Hermann,** novelist and dramatist, born in Matzieken, Germany, Sept. 30, 1857. After attending a gymnasium and attaining a university education, he became a journalist in Berlin, where he wrote for a small weekly news and society paper. In a few years he severed his connection with that periodical and engaged in writing novels. The first three of his writings published before 1889 include "In the Twilight," "Dame Care," and "The Cat's Way." His first eminent success was attained by publishing "Honor," a drama that appeared in 1890. In 1893 he published his

drama entitled "Home," which was made famous by Sarah Bernhardt in France. It has been translated into Italian, English, Russian, and several other languages. Other writings from his pen include "Battle of the Butterflies," "Happiness in a Corner," "Sodom's End," "Three Feathers," and "Book of My Youth."

SUE (sū), **Marie Joseph Eugéne,** eminent novelist, born in Paris, France, Dec. 10, 1804; died at Annecy, France, Aug. 3, 1857. He was the son of a physician to Napoleon and, after receiving an education for the profession of surgery, entered the service as an army surgeon in 1824. He served in the French expedition to Spain in 1828, but was transferred to the navy, and personally witnessed the Battle of Navarino in 1828. The death of his father in the following year brought him into possession of a considerable fortune, and he began to use his military experience in writing novels. The first decidedly successful work from his pen was "The Mysteries of Paris," which he published in 1842 in the *Journal of Debates,* but soon after it was issued in an edition of ten printed volumes. Sue is best known by his work entitled "The Wandering Jew," which has since been widely translated and reissued from time to time. He displayed power and genius in most of his writings and developed an immense popularity, but some of his works are not of substantial value. In 1850 he became a deputy in the French assembly, but on the accession of Napoleon III. the following year he retired from public life. Among his writings not named above are "Mysteries of the People," "Seven Capital Sins," and "Jean Cavalier." Sue was influential as a member of the constitutional assembly, but withdrew and settled in Annecy.

SUETONIUS TRANQUILLUS (swē-tō'-nĭ-ŭs), **Gaius,** historian, born in Rome about 70 A. D.; died about 160. It is not certain when he was born, but it is probable that the time of his birth was near the beginning of the reign of Vespasian. Emperor Hadrian employed him in an official capacity, chiefly as private secretary, but he was dismissed because of being intimate with the Empress Sabina. The remainder of his life was probably devoted to literary pursuits, since he is the author of numerous works. His chief work, entitled "Lives of the Twelve Caesars," gives an account of the twelve Roman emperors from Julius Caesar to Domitian. The domestic customs and gross excesses of the emperors are related minutely, a marked feature that renders this production of great value.

SUEZ (sōō-ĕz'), a seaport in Egypt, at the Red Sea terminus of the Suez Canal, 75 miles east of Cairo, with which it has railroad connection. It was a small Arab village of little importance until the Suez Canal was constructed and a canal was built from the Gulf of Suez to the Nile, but it is now the seat of considerable trade. Suez has immense store and ware houses, a good harbor, and a large stone causeway to carry the railroad to the harbor of Port Ibrahim. The noteworthy buildings include a handsome Greek church, two hospitals, a custom-house, several schools, and a number of government buildings. A canal from the vicinity of Suez to the Nile was maintained in ancient times by the Ptolemies, but at various periods fell into a state of decadence. Population, 1907, 18,347; in 1922, 19,041.

SUEZ CANAL, the great ship canal across the Isthmus of Suez, a strip of land that separates the Red and Mediterranean seas. It extends from Port Said on the Mediterranean to Suez on the Red Sea, a distance of 98 miles, 21 miles of which consists of small lakes. The honor of conceiving the idea of constructing a ship canal without locks across the Isthmus of Suez is due to Napoleon I., a project he formed when the French occupied the town of Suez in 1798. A concession to build the canal was granted to M. Ferdinand de Lesseps, a French engineer, in 1854, and work began under his direction on April 25, 1859. The canal cost $90,000,000 and was formally opened for the passage of vessels on Nov. 17, 1869. It was originally from 196 to 327 feet wide at the surface, 72 feet wide at the bottom, and 26 feet deep, but a large increase in the canal traffic has caused the commission to widen and deepen it materially. Side basins are maintained in several places to facilitate the passage of vessels.

In 1887 a system of electric lights was stationed along the canal to facilitate the movement of vessels at night. Steamships sail at a speed of from five to six knots an hour and require sixteen to twenty hours in making the passage, which costs about $500. The canal is under the direction of a canal commission, which has a lease of the land on both sides of the canal for 99 years and holds annual meetings at Paris. Few American merchant vessels use the canal, but it is the seat of a remarkable traffic, the majority of which is carried by English and German vessels. About 5,500 vessels pass through the canal annually, having a gross tonnage of 37,310,000 tons and paying about $38,280,900 in tolls. A fine bronze statue of Lesseps was unveiled at Port Said on Nov. 17, 1899.

SUFFOLK, county seat of Nansemond County, Va., 22 miles southwest of Norfolk, on the Nansemond River and on the Southern and other railroads. It has iron works, railroad shops, hosiery mills, and fine public buildings. Population, 1920, 9,123.

SUFFRAGE (sŭf'frāj), the privilege of participating in the government of a state or nation by voting at an election for officers or a change in the fundamental law. Two theories have been advanced regarding the suffrage, one of which implies that it is a privilege extended by the government to be exercised under certain restrictions, and the other that it is a natural right, like liberty. The latter has come to be the common view held by people of progressive

SUGAR CANE.
(Sacebarum officinarum).

A. Plant (reduced). B. Part of stem, with Leaf. C. Inflorescence. 1-6. Parts of Flower.

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nations, but the former principle is the one on which the majority proceed in practice. Suffrage was limited more or less in the English colonies of North America. The general limitations included that the individual must be a male freeholder, possess property of a certain value, or pay taxes of a certain amount. These restrictions were gradually removed after the Revolution, but the Constitution rests in the several states the right to fix the qualification of the voters. In Canada, especially since 1917, the women have large political rights.

The Fourteenth Amendment to the Constitution provides for the reduction of representation of a State in Congress, in proportion to the number of citizens deprived of suffrage, except for crime. This was intended to guard against the disfranchisement of the Negro population The Fifteenth Amendment forbids the denial to a citizen of the right to vote on account of race, color, or previous condition of servitude. This amendment does not guarantee a vote to every citizen, but provides that, if any citizen vote, others shall not be forbidden to vote for any of the above reasons. Male suffrage was provided for by the states as soon as they were formed, but there are still restrictions of various kinds, among them the payment of taxes, ability to read and write, and several others. The territories have no voice in the Federal elections, and neither have the inhabitants of the District of Columbia, which is under the immediate control of Congress. Female suffrage has been placed on an equality with male suffrage in all the states and some form of suffrage has been given women in nearly all countries. Women had full suffrage in Arizona, California, Colorado, Idaho, Illinois, Kansas, Montana, Nevada, New York, Oregon, Utah, Washington, and Wyoming even before the XIX Amendment was adopted.

SUGAR (shŏŏg'ĕr), a sweet, crystalline compound derived chiefly from the juice of the sugar cane and sugar beet. However, it occurs in many other vegetables. Among the various sources of sugar are the sap of some trees, the seed, flowers, and fruits of some plants, the juices of various roots and grasses, and the milk of animals. Sugar was first made from sugar cane in India, whence the art of manufacture was carried to Arabia, and later it was introduced by the Moors into Spain. The Spanish colonists brought sugar cane to the West Indies, where it proved a plant of great value, and in 1751 it was introduced for culture in Louisiana.

Sugar Cane. The plant known as *sugar cane* is not met with in a wild state, but is thought to be a native of tropical Asia, where it was developed by carefully cultivating allied species of grasses. The leaves are broad, smooth, and from three to five feet long. The stems have a shining effect, growing usually to a height of seven to twelve feet. Within the stem is a sweetish pith, which supplies the juice essential in the production of sugar. It requires a rich soil and an abundance of moisture during the growing season. Low land is the most suitable, especially where the soil is of a rich, alluvial character. The plants are propagated by cuttings of the top joints, which are planted in rows five to seven feet apart.

Cane Sugar. About one-half of the sugar sold on the market is obtained from sugar cane. The stems are first stripped of their leaves and the seed tops are clipped off, and they are then cut a short distance above the ground. After expressing the juice from the stems by means of a cane mill, it is conducted into tanks and carefully strained into a receptacle. From this it is drawn off into a series of pans to be evaporated by heat until it becomes granular, after which the dry sugar is separated from the syrup by means of machinery. In the ordinary process of evaporating the juices, common brown sugar is formed, usually called *raw sugar*, and this needs to go through a refining process before the higher grades of marketable sugars are obtained. This is done usually by dissolving the raw sugar in hot water, and, after adding a solution of lime or sulphuric acid, it is passed successively through bags made of cloth and through animal charcoal, which serve to remove all impurities and take out the color. The liquid mass is then boiled a second time to take out the dampness, and the sugar crystals resulting are perfectly white.

SUGAR CANE.

Granulated sugar is made by separating the syrup from the crystals in a machine that revolves rapidly. By placing small quantities of the granulated sugar, before it is completely dry, into molds and drying, *lump sugar* results. *Loaf sugar* is the product which is obtained when the refined liquid sugar is evaporated in pans. Many widely different processes are employed in manufacturing sugar, several distinct kinds of machinery being used in the making of the various classes of products. Cane mills are usually constructed with two or three rollers, between which the sugar cane is crushed and the juice is collected in pans below. Horse power is used

to propel the mills in small plantations, but in the larger establishments steam power is applied.

Beet Sugar. Beet sugar is a product of the sugar beet, the juice of which yields from 10 to 20 per cent. of sugar. It is made in practically the same way as cane sugar after the juice has been secured by crushing the root. The product obtained from the sugar beet has entered very largely into direct competition with the product secured from the sugar-cane plantations of the West Indies, the East Indies, Australasia, and the tropical regions of America, Asia, and Africa. Germany is at present the largest producer of beet sugar, the annual yield averaging about 1,975,000 tons. The countries taking next rank are Austria, Hungary, France, Russia, Belgium, Holland, and the United States. Austria and Hungary produce annually about 200,000 tons, and France 850,000 tons. In 1922 the United States produced 780,000 tons of beet sugar and about one-third as much of cane sugar. The beet-sugar industry has made rapid progress in Canada the last decade, notably in Ontario.

Other Classes of Sugar. A fine quality of sugar is made from the sugar maple, especially in New England, Ohio, West Virginia, New York, Pennsylvania, New Brunswick, and Ontario. The sap of the sugar maple is obtained in the spring as the sap flows upward, and is evaporated and treated quite like the sap obtained from other sources. Large quantities of maple sugar are used in making confections. A class of sugar known as *jaggery* is obtained from several species of palms. It is a dark colored raw sugar and is produced in comparatively large quantities. Other plants which yield sugar include the sorghum plant and the ordinary field or Indian corn.

Consumption of Sugar. The total consumption of sugar in the world, in 1922, was 17,500,000 tons, of which 6,190,000 tons were beet sugar. Much of the raw sugar consumed in the United States is imported and refined by domestic manufacturers. The annual consumption in that country averages 4,525,000 tons, of which only about 25 per cent. is wholly of domestic production. In 1922 the consumption was 4,519,847 tons, or 90 pounds per capita, of which 3,550,014 tons were imported. England consumes 91.6 pounds of sugar per capita, the largest in the world. Switzerland consumes 60.3 pounds; Canada, 54; Sweden, 38; France, 36; Germany, 34; and Russia, 14.

Composition of Sugar. Sugar is composed of various proportions of oxygen, carbon, and hydrogen. The constituents in all kinds of sugar are the same, but they differ materially in the relative quantities. *Grape sugar* occurs in the juices of various fruits, such as the currant, apple, peach, and grape. It varies in quantity from 1 to 15 per cent. *Glucose,* or *starch sugar,* is a kind of grape sugar and is made by boiling starch in sulphuric acid and water, the action of the acid being to unite some of the oxygen and hydrogen of the water with the carbon, thus forming a syrup. The acid is afterward removed by adding carbonate of lime, which operates to combine the sulphuric acid with the lime and thus frees the carbonic acid. Afterward the sugar is crystallized by boiling the mixture and thereby evaporating the water. Other sugars are those made of barley, honey, and various allied substances. See **Beet; Molasses; Sorghum.**

SUGAR CANE. See **Sugar.**

SUICIDE (sū'ĭ-sīd), the crime of a person who kills himself with malice aforethought. Suicide is uncommon, though not entirely unknown, among uncivilized peoples. It is resorted to more generally in the highly civilized countries than those that rank as semicivilized, and the crime appears to have gained in extent more rapidly within the last century than at any other equal period in the world's history. Although the ancients did not regard suicide a crime or even as dishonorable, it was less common anciently than now. That this means of ending their lives was chosen by Demosthenes, Cleopatra, Hannibal, Mark Antony, and Themistocles is assigned to some event in their lives or marked changes in conditions, such as caused them to act from the impulse of despair. On the other hand, the Scriptures furnish numerous examples of suicides through revenge or remorse, such as those of Samson and Judas Iscariot.

Suicide is usually looked upon as the result of insanity, or as a symptom showing that the brain is diseased. Some writers are inclined to look upon the act with such dread, both from the standpoint of ending mortal existence wrongfully and from the viewpoint of passing into eternity under the most unfavorable circumstances conceivable, that they regard suicide by a sane person impossible. On the other hand, there are writers who believe a sane person may commit the act after careful deliberation and as considerately as he might consummate a matter of business. However, the majority of suicides are known to be due to melancholy and the excessive use of intoxicants, such as opium and alcohol. Statistics show that two-fifths of those suffering from melancholia make suicidal attempts upon their lives. Those engaged constantly in work or under the heavy pressure of business, especially where they are exposed to worry and strenuous competition and are barred from a calm consideration of the higher phases of life, are exposed to the dangers of this crime. Frequently suicide is suggested during a state of excitement by the sight of means to destroy life, such as a weapon or a torrent of water. The tendency is undoubtedly inherited in many instances, since suicides, like some diseases, may be traced to a number of members belonging to the same family. An attempt to commit the crime is punishable in some countries, as in a number of the states of the United States. For-

merly the laws of England worked a forfeiture of the goods and chattels belonging to the suicide and the body was buried ignominiously, usually with a stake thrust through it, but this practice fell into disuse at the time of George IV.

Suicides are more numerous among men than among women, the proportion being about three to one. Children at the age of five years have committed the act, and even persons over ninety, but the greatest number occur between the ages of 40 to 44. Suicides are more numerous among single than among married people, and the rate is higher in large cities than in towns and country districts. The greatest percentage is among military men, but the rates are comparatively high in the professional and commercial classes. Laborers are less prone to the act than artisans. The principal means of ending life are hanging, shooting, drowning, poisoning, and jumping from heights.

The notable suicides mentioned in history include the following:

Sappho	B.C. 7th C.	Marcus Salvius Otho	69
Themistocles	449	Thomas Chatterton	1770
Empedocles	435	Robert Clive	1774
Demosthenes	322	Charles Pichegru	1804
Hannibal	183	Sir Samuel Romilly	1818
Mithridates	63	Robert Stewart Castlereagh	1822
Cato the Younger	46	Admiral Robert Fitzroy	1865
Brutus and Cassius	42	Louis II. of Bavaria	1886
Mark Antony	30	Crown Prince of Austria	1889
Cleopatra	30	José Manuel Balmaceda	1891
	A. D.	Georges Boulanger	1891
Judas Iscariot	29		
Nero	68		

SULIOTES (sōō'lê-ōts), the name of a race of people who occupied the valley of the ancient Acheron, in European Turkey, where they settled in the 17th century to escape the oppression of the Turks. They descended from Greek and Albanian shepherds and were named Suliotes from the mountains of Suli in the south of Albania, where they supported themselves by rearing cattle and pursuing agricultural arts. By the close of the 18th century they had increased to considerable numbers and were successful in resisting the attacks of the Turks. Their government was in the form of an independent republic, with the center of influence at the village of Suli, which was finally taken by the Turks in 1822, and the Suliotes moved southward to different parts of Greece. An effort was made to regain their former possessions by Marco Bozzaris, but he was ultimately required to retreat into Greece. The Congress of Berlin, in 1878, recommended that the region formerly occupied by them should be annexed to Greece, but this recommendation was not complied with.

SULKY (sŭlk'ў), a light vehicle with two wheels, fitted with a seat for one person and drawn by a single horse. Vehicles of this class are used extensively for training horses or driving them in races. The driver occupies a seat quite near the horse, usually over the rear end of the shafts. Sulkies of modern construction are very light, and the better grade have ball bearings and pneumatic tires.

SULLA (sŭl'lȧ), **Lucius Cornelius,** Roman dictator, born in 138; died in 78 B. C. His father was a poor nobleman, but he had the advantages of a good education, and later a fortune was left to him by a relative, thus facilitating his promotion to rank and office. He was made questor in 107 B. C., and with a force of cavalry proceeded to Africa to assist Consul Marius in the Jugurthine War. His eminent ability brought about the capture of King Jugurtha, whom he brought in chains to Rome the following year, and from 104 to 102 he took part in the Cimbrian War. His efficient services caused him to be made pretor in 93, but a prolonged quarrel between him and Marius led to the social war from 90 to 88, in which he secured fame for gallant service and was accordingly made consul. His command included the province of Asia, where he had charge of the second war against Mithridates, but most of the actual warfare was conducted against Archelaus in Greece, who was an active ally of Mithridates. After defeating Archelaus in the great Battle of Chaeronea, in 86, he crossed the Hellespont and compelled Mithridates to conclude terms of peace, and in 83 returned to Italy.

LUCIUS C. SULLA.

Although Marius had died in 86, the property of Sulla had been confiscated by the strong party of Marius and he had been proscribed. Accordingly he was obliged to fight the Battle of Brundusium shortly after landing on the Italian shore, and, after gaining successive victories, marched into Rome in 82, where he immediately proscribed 3,000 of his enemies and put a large number of prisoners of war to death in the Roman circus. Sulla being now master of Italy and the Roman world, a reign of terror followed, and the power of the people was lessened by strengthening the functions of the senate. He was appointed dictator in 81, a position he held three years, after which he resigned to enjoy ease and sensual pleasures on his fine estate at Puteoli. In his closing years he practiced a high degree of debauchery and hastened his death. It was his common boast that he avenged every wrong inflicted by an enemy, and repaid every act of kindness accorded to him by his friends.

SULLIVAN (sŭl'lĭ-vạn), **Sir Arthur Seymour,** composer, born in London, England, May 13, 1842; died Nov. 22, 1900. His father was a bandmaster at the training school for British military bands. After taking a course of instruction in his native city, he proceeded to Leipsic, Germany, where he studied at the Conserva-

torium for three years. He returned to England in 1861 and prepared the music to Shakespeare's "The Tempest." Soon after he wrote music for other Shakespearean plays, including "The Merchant of Venice," "The Merry Wives of Windsor," and "Henry VIII." In 1864 he wrote the cantata "Kenilworth," which was produced with much success at the Birmingham festival. He was principal of music in the Royal College from 1867 to 1881, and within that period produced many of his excellent compositions. The most celebrated of his comic operas is "Pinafore," which had a run of 700 consecutive nights in London and was played in New York at four different theaters for months at a time.

Sullivan was the idol of London for many years, officiating as director of music in all of England's public affairs for nearly a quarter of a century. The queen knighted him at Windsor, in 1883, and he was awarded the cross of the Legion of Honor of France in 1878 while officiating at the Paris Exhibition. He was the recipient of degrees from Cambridge and other noted universities. Among his productions not mentioned above are "The Pirates of Penzance," "Princess Ida," "The Mikado," "Gondoliers," "Patience," "Iolanthe," "The Sorcerers," and "Ruddygore." His oratorios and sacred musical dramas include "The Prodigal Son," "On Shore and Sea," "The Golden Legend," "The Light of the World," "The Martyr of Antioch," "In Memoriam," and "Te Deum." He served a number of years as musical editor of church hymns.

SULLIVAN, John, soldier, born at Berwick, Me., 1740; died Jan. 23, 1795. He studied law and practiced his profession, but volunteered his services for the American cause in the war of independence. In 1774 he aided in the capture of Portsmouth, N. H., and the following year was made a brigadier general. He commanded the army that invaded Canada in 1776, but, after an unsuccessful attack of Three Rivers, he joined Washington at New York. The same year he was made major general and commanded in the Battle of Long Island and subsequently took part in the battles of Trenton, Princeton, Brandywine, and Germantown. In 1778 he commanded at the siege of Newport, where he was aided by the French fleet, and subsequently fought against the Tories and Indians in New York. He was elected to Congress in 1780, was President of New Hampshire from 1786 to 1789, and later served as United States district judge in that State.

SULLIVAN'S ISLAND, an island six miles below Charleston, S. C., lying between its harbor and the ocean. It is the site of Fort Moultrie and is a popular summer resort and residence of Charleston business men. Ferryboats connect it with Charleston. Fort Moultrie was evacuated on Dec. 26, 1860, by Major Anderson.

SULLY (sŭl'lĭ), **James,** educator, born at Bridgewater, England, March 3, 1842; died Nov. 22, 1900. He studied at Taunton and Regent's Park College, London, and subsequently took advanced courses in the universities of Berlin and Göttingen. In 1892 he was made professor of philosophy of mind and logic in University College, London, where he served with eminent success a long term of years. He ranks as one of the most eminent psychologists of England, and a number of his books have been used extensively in Europe and America as educational texts. They include "The Teacher's Handbook of Psychology," "Sensation and Intuition," "The Human Mind," "Studies of Childhood," "Essay on Laughter," and "The Children's Ways."

SULLY, Maximilien de Béthune, Duke of, Marshal of France, born at Rosny, France, in 1560; died Dec. 22, 1641. He descended from a distinguished family of wealth and influence, and under the direction of Henry of Navarre received an excellent education and military training. In 1575 he narrowly escaped the Saint Bartholomew massacre, and afterward exerted himself with great valor in several important battles. King Henry selected him as counsellor of state and finance in 1594, in which capacity he not only reduced taxation, but greatly decreased the national debt, encouraged agriculture, and extended commercial enterprises. He was created Duke of Sully and in 1606 was made a peer of France. He resigned the superintendence of finance shortly after the murder of Henry IV., in 1610. Richelieu recalled him to public service in 1634 and made him Marshal of France. He wrote several treatises on war and police and published his personal "Memoirs."

SULPHATES (sŭl'fāts), the salts of sulphuric acid, some of which occur as native minerals, while others are prepared artificially. The *sulphates of aluminum* are of value commercially and embrace the alums, a class of double salts, formed of aluminum sulphate with the sulphates of ammonia, potash, or soda. *Ammonium sulphate* is made largely from the ammoniacal liquor of gas works, and is employed as a fertilizing agent. *Nickel sulphate* consists of green crystals and is used in nickelplating. The *sulphate of quinine* is employed in medicine; the *sulphate of zinc,* or *white vitriol,* is used in surgery and in calico printing; and the *sulphate of iron,* or *green vitriol,* is of great value in medicine, for making inks and dyes, and in calico printing. The *sulphate of copper,* or *blue vitriol,* is used in preparing green coloring matters and in surgery. Other important sulphates include those of cobalt, calcium, mercury, silver, and uranium.

SULPHONAL (sŭl'fō-năl), a substance used in medicine to produce sleep. Though poisonous in its nature, it is harmless as a hypnotic agent when administered in proper quantity. It is best taken with hot milk, since it is not highly soluble in water. Its advantage over chloral is that it has no depressing influence upon the action of the heart. If taken in excessive doses,

it is liable to cause eruptions of the skin and various functional disorders.

SULPHUR (sŭl'fŭr), a nonmetallic element of a lemon-yellow color, which is widely diffused in the mineral kingdom, both in the free state and in combination with other substances. *Metallic sulphates* and *metallic sulphides* are the terms applied to substances that contain it in combinations, hydrated sulphate of lime being the most abundant of the former and metallic ores of the latter. Elementary sulphur is met with extensively in the organic world, forming an essential component of the albuminoids, a class of compounds occurring both in animal and vegetable structures. Animal hairs contain about 4 per cent. of sulphur. The essential oils of garlic, onion, and mustard embrace a considerable quantity. Sulphur in the free state is most abundant in volcanic regions, the most extensive deposits being in Sicily, where about 400,000 tons are produced annually. Extensive deposits occur in California, especially in the vicinity of Borax Lake, and in Canada, Mexico, Iceland, Germany, France, Italy, and Spain.

Sulphur has neither taste nor smell, is a poor conductor of heat and electricity, and is not soluble in water. When rubbed or melted, it emits a peculiar odor, and may be easily melted and volatilized. It fuses at 257°, and, when its temperature is raised to 790°, it rises in vapor that condenses in the form of a fine yellow powder known as *flowers of sulphur.* Roll sulphur, or brimstone, is made by melting and pouring it into molds. It takes fire in the air at a temperature below redness. Its combustion is attended by disagreeable fumes and in unison with oxygen it forms sulphur dioxide, called also sulphurous acid gas and sulphurous oxide. It unites directly with other elements when highly heated, which may be seen by the circumstance that copper burns brightly in sulphur vapor. Sulphur is used in the manufacture of matches, gunpowder, and sulphuric acid. It serves an important purpose in bleaching, in vulcanizing India rubber, and in many other operations. The chief sources of supply in North America are in Louisiana, Nevada, Texas, California, and Ontario. Some of the most productive sulphur mines of the United States are in Calcasieu Parish, Louisiana.

SULPHURETED HYDROGEN (sŭl'fū-rĕt-ĕd hī'drō-jĕn), an inflammable gas found in certain mineral waters and produced by the decomposition of organic matters that contain sulphur. It is emitted during a volcanic eruption, and may be produced artificially by burning sulphur vapor in hydrogen. The odor is nauseous and the substance is deadening if it is inhaled in large quantities. During volcanic action it sometimes overcomes man and animals. Sulphureted hydrogen is colorless, is soluble in water and alcohol, and has the property of turning blue litmus paper red. This gas is somewhat heavier than air and, if mixed with 1.5 volumes of water and ignited, it explodes. It is used in analytical chemistry and for the manufacture of metallic sulphides. In some instances it is employed to purify sulphuric acid. Sulphureted hydrogen is called *hydrogen sulphide* and *hydrosulphuric acid* by some writers.

SULPHURIC ACID (sŭl-fū'rĭk), or **Oil of Vitriol,** an acid discovered in the latter part of the 15th century by Basil Valentine (born about 1414). It is a colorless, oily liquid. Sulphuric acid is tasteless, reactive, and intensely acid. When coming in contact with animal and vegetable substances, it has the effect of quickly charring them. The specific gravity is about 1.72. It is soluble in water, for which it has so strong an affinity that it causes the formation of water in many substances which do not contain that element. Sulphuric acid is obtained in small quantities by boiling sulphur in nitric acid, but it is produced on a larger scale by the distillation of green sulphate of iron, and by the oxidation of sulphurous acid through the agency of nitric acid and hyponitric acid. There are many uses of sulphuric acid, especially in making alum, soda, and phosphorus. It is employed in refining petroleum, in making fertilizers, and in treating typhoid fever and many other diseases.

SULPHUR SPRINGS, county seat of Hopkins County, Tex., 78 miles east of Dallas, on the St. Louis Southwestern and other railroads. The industries include cotton gins, brick yards, and grain shipping. Among the chief buildings are the courthouse, high school, and city hall. It is so named from its sulphur-laden springs. It was incorporated in 1888. Pop., 1920, 5,558.

SULTAN (sŭl'tăn), an Arabian word, meaning *mighty one,* applied as the title to the Emperor of Turkey. The mother of the eldest son of the Sultan is called the *hasseki sultan,* and the term *sultana* is applied to women.

SULU ISLANDS (sōō-lōō'), or **Joló Archipelago,** an island group of the Philippines, lying between Mindanao and Borneo. The northern coasts are washed by the Sulu, or Mindora, Sea, and its southern, by the Celebes Sea. It includes about 150 islands. All are of volcanic origin. The area is given as 1,050 square miles. The chief island is Cagayán Sulu, with a length of 36 miles and a breadth of 12 miles. It contains the town of Sulu, or Joló. The archipelago is divided into three divisions, known as the Sulu, Tapul, and Tawi Tawi groups.

The soil is generally fertile and the climate is favorable, but the archipelago is subject to hurricanes. Among the productions are rice, tropical fruits, gum mastic, timber, coffee, pearl shells, edible birds' nests, resins, and various minerals. Horses, cattle, goats, and buffaloes are grown in abundance. The inhabitants are mostly of Malay descent and the chief religion is Mohammedan, whose adherents are known as *Moros.* Spain long claimed sovereignty of the islands, but they were ceded, along with the Philippines, to the United States in 1898. The

archipelago has innumerable villages and several growing seaports. Population, 1922, 52,836.

SUMAC (sụ'măk), or **Sumach,** a genus of trees and shrubs, which includes about fifteen species that are native to North America. About 100 species have been described, most of which are widely distributed, except in the coldest regions. In the *Virginian sumac,* which is found in many sections of North America, the leaves are pinnate and the flowers are small. The wood and bark yield an acrid juice of value in the arts. In most species the flowers are yellowish-green, usually growing in a cluster, and are followed by a group of reddish-colored fruit. In early autumn the leaves assume a scarlet hue and soon fall to the ground. The most widely distributed species is the *smooth-leafed sumac* of the United States, which grows to a height of ten or twelve feet. It yields properties of value in tanning and for medicine. The *poison oak* of North America is a shrub from one to four feet high, and a closely related species known as *poison ivy* is a vine quite largely distributed. *Swamp sumac,* or *dogwood,* is common to the swamps, where it grows as a shrub to a height of fifteen feet. The seeds of this species yield an essential oil used in candle making. The *Venetian sumac* and *elm-leafed sumac* are species native to Europe, where they are utilized largely for tanning, dyeing yellow and black, and in medicine. *Japan sumac* is native to Japan. It yields a varnish of value for lacquer work. This varnish is made from the juice, which is secured by cutting a wound in the tree, and on exposure to the air it becomes thick and black. A vegetable wax is obtained from the oil of the seeds and is used for candles. Much of the sumac sold in the trade is obtained from Sicily.

POISON SUMAC.

SUMATRA (sōō-mä'trà), an island in the Indian Ocean, lying southwest of the Malay peninsula, from which it is separated by the Straits of Malacca. Sunda Strait separates it from Java, and Banka Strait lies between it and the island of Banka. It is 1,112 miles long and is divided into nearly equal parts by the Equator. The width is 245 miles and the area is given at 184,768 square miles. The Barisan Mountains traverse near the western coast, their peaks ranging from 1,500 to 6,000 feet, but the elevations culminate in the volcano Indrapura, height 12,575 feet. Along the western coast is a plain only a few miles in width, which is covered with dense forests and has extensive jungles, while the eastern part of the island is a plain with fertile soil. This plain is traversed by numerous rivers, including the Jambi, Indragiri, Siak, Musi, and Bangka, all of which have a general course toward the east. The eastern shore has a number of important inlets, and off the eastern and western shores are numerous islands of more or less fertility.

In the interior of Sumatra the climate is hot and the presence of large marshes makes various fevers quite prevalent, but the coast and highland regions are generally healthful. Monsoons and earthquakes are not infrequent. Rains fall copiously in all months of the year. Among the minerals are limestone, granite, serpentine, basalt, sandstone, saltpeter, coal, copper, lead, iron ore, sulphur, silver, alum, and mineral oils. The flora is very extensive, including many kinds of valuable forest trees, fruits, flowers, grasses, shrubs, and berries. It has an abundance of wild animal life, especially the rhinoceros, leopard, elephant, tapir, antelope, tiger, bear, ant-eater, bat, deer, numerous monkeys, and many species of insects. Crocodiles and hippopotami abound in the rivers. Salmon and other fisheries are abundant. The domestic animals include horses, buffaloes, goats, swine, sheep, and poultry.

The natives of Sumatra belong to the Malay race and are largely Mohammedans. They are active, intelligent, tall, and quite industrious, but are extremely fond of opium. Polygamy prevails in many sections of the island. A modified system of castes is prevalent, largely for the reason that the Mohammedan faith is not wholly understood. It has an extensive trade with Holland and other European countries and with the United States. The exports include pepper, gold, sappan wood, cotton, precious stones, raw silk, tobacco, sulphur, coffee, camphor, and tropical fruits. Among the chief imports are drugs, rice, textiles, clothing, and utensils.

Marco Polo discovered Sumatra in the 13th century, but trade relations with the Europeans were not established until 1508. The Dutch founded settlements in 1601. They gradually developed various industries and established their seat of influence at Padang in 1666, and in 1881 acquired full control of the entire island. Since then it has been one of the most productive island possessions of Holland. It is divided into six districts, known as West Coast, East Coast, Benkulen, Palembang, Lampongs, and Acheen. The principal seaports include Acheen, or Achin, and Benkulen. Population, 1922, 4,029,505.

SUMBAWA (sōōm-bä'wà), an island of the East Indies, belonging to the Sunda group of islands, situated between Java and Flores. It is separated from Lombok by Atlas Strait. The length from east to west is 160 miles. It has

an area of 4,850 square miles. The surface is mountainous and volcanic. Tembora, on the northern coast, is an active volcano and has a height of 8,940 feet above the sea. Gold, rice, wood, fruits, and live stock are the principal products. The island is a possession of Holland. A large majority of the inhabitants are Malays who adhere to the Moslem faith. Population, 1922, 150,024.

SUMMER, the warm season of the year, following spring and preceding autumn. It begins with the summer solstice, about June 21, and ends with the autumnal equinox, about Sept. 22. In Canada and the United States summer comprises the months of June, July, and August, and in England it includes the months of May, June, and July.

SUMMIT (sŭm'mĭt), a city of New Jersey, in Union County, 12 miles west of Newark, on the Delaware, Lackawanna and Western Railroad. It is the residence of many business men of Newark and New York. The chief buildings include the Arthur Home for Orphans, the public library, and several schools and churches. It has manufactures of silk textiles, clothing, and machinery. Electric lighting, waterworks, and sewerage are among the public utilities. Population, 1905, 5,673; in 1920, 10,174.

SUMNER (sŭm'nĕr), **Charles,** jurist and statesman, born in Boston, Mass., Jan. 6, 1811; died in Washington, D. C., March 11, 1874.

CHARLES SUMNER.

After graduating from Harvard University, in 1830, he studied law with Judge Story and was admitted to the bar in 1834. He made an extended tour of Europe from 1837 to 1840, and, after returning to America, entered the law practice in Boston. On July 4, 1845, he delivered his celebrated oration, "The True Grandeur of Nations," which attracted much attention in America and Europe, and soon after that he became prominently connected with active politics. In 1851 the Democrats and Free Soilers united in electing him United States Senator to succeed Daniel Webster, which position he held continuously until his death. He speedily became the chief advocate of the antislavery movement. Among his noted speeches on that subject are those known as "Freedom National, Slavery Sectional" and "The Crime Against Kansas." The last mentioned caused Preston Brooks, a Senator from the South, to make a personal assault upon him, from which he received injuries that prevented him from taking his seat until 1859. He was soon after reëlected Senator as a Republican, and as chairman of the Committee on Foreign Affairs was a valuable friend and adviser of President Lincoln. In April, 1865, he delivered the eulogy on Lincoln.

Sumner opposed President Johnson and the treaty with San Domingo, but favored the purchase of Alaska. His opposition to the San Domingo treaty, in 1871, lost him the support of President Grant and the Republican senators, as well as the chairmanship of the Committee on Foreign Relations. In 1872 he supported Greeley for President. His closing effort in public life was the introduction of a bill in the Senate having for its object the protection of the civil rights of colored citizens. Sumner was editor of the *American Jurist* shortly after graduating, lectured at Harvard, and edited three volumes of law decisions. His public addresses and orations were published in a complete form in fifteen volumes, having been edited partly by himself and partly by Longfellow, who was his literary executor. The public addresses of Sumner were first published under the title "Orations and Speeches" and later were added "Recent Speeches and Addresses."

SUMNER, Edwin Vose, soldier, born in Boston, Mass., Jan. 30, 1797; died March 21, 1863. He studied at Milton Academy and in 1819 became second lieutenant in the United States army. Until 1838 he served on the frontier, but in that year took charge of the school of cavalry at Carlisle, Pa. He served as major during the Mexican war, taking part at Cerro Gordo and Molino del Rey, and in 1851 became Governor of New Mexico. Subsequently he saw service against the Indians and in 1861 was assigned to the army of the Potomac, with which he served at Fair Oaks, Antietam, and Fredericksburg. In 1863 he was assigned to the department of Missouri, but died before assuming duties in the West.

SUMPTUARY LAWS (sŭmp'tū-ă-rĭ), the name of statutes that aim to regulate private expenditures, such as extravagance in the purchase and use of clothing. Laws of this kind were deemed essential in ancient Greece and Rome, where legislation was directed with the view of avoiding extravagance in dress, entertainments, and even funerals. The purpose of such laws was not solely to prevent extravagance, but likewise to overcome crime, poverty, and immorality. Costly banquets and funerals were prohibited by the laws of Solon, and the early laws of Rome limited the expenditures and specified the number of guests that might be entertained at banquets. In England, during the reign of Edward III., the kinds of clothing that might be worn by certain classes were prescribed and not more than two courses were permitted at a meal. In the colonial times Massachusetts undertook to regulate the cost of funerals. At present the tendency of govern-

ment is to guarantee personal liberty, leaving it to the individual as to the habits, occupation, food, drink, and clothing that he may see fit to adopt. However, legislation is directed toward the protection of public health and public safety. Prohibition of the liquor traffic is a form of sumptuary legislation.

SUMTER (sŭm'tĕr), a city in South Carolina, capital of Sumter County, 43 miles east of Columbia, on the Southern and the Atlantic Coast Line railroads. The surrounding country is fertile, producing cereals, tobacco, vegetables, and fruits. It has a growing trade in cotton, live stock, and merchandise. The noteworthy buildings include the county courthouse, the high school, two academies, and a number of churches. Among the manufactures are cotton textiles, furniture, cigars, and earthenware. Electric lighting, sanitary sewerage, and waterworks are among the improvements. Population, 1900, 5,673; in 1920, 9,508.

SUMTER, Thomas, soldier, born in Virginia in 1734; died June 1, 1832. His early life was spent in South Carolina, where he took part in the Cherokee War. In 1776 he was made lieutenant colonel in the Continental army, serving in his State until the fall of Charleston, when he raised a large force in North Carolina, with which he defeated the British in 1780. The same year he gained a victory at Hanging Rock, but later was routed by Tarleton at Fishing Creek. Tarleton again defeated him at Blackstock Hill, where he was severely wounded, but he returned to the active service in 1781. He was elected to Congress in 1788 and at two succeeding elections, and became a member of the United States Senate in 1801 and again in 1811. From 1809 until 1811 he was United States minister to Brazil. He was the last surviving general officer of the Revolutionary War.

SUN, the central luminary of the solar system. It is the center of gravity and the main source of light and heat, and is regarded by astronomers as a star. The sun is important and magnificent above all other objects in the universe, and, obedient to the power of its attraction, all other bodies journey around it. Light and heat are scattered throughout space by its radiant energies, thus making the existence of every form of life activity either directly or indirectly dependent upon it. The transformation of solar energy is the basic cause of every variety of animate or inanimate motion upon the earth.

The sun was worshiped in ancient times, when it was held in veneration as the lord of the day. It was thought for ages that this central luminary moves in a mysterious way while the earth is at rest, and, though astronomers sought to arrive at accurate theories regarding its influence on planetary bodies, it was left for the astronomer Copernicus (q. v.) to announce, in 1530, that the sun is the center of the solar system and around it move all other heavenly bodies within the sphere of its influence. Since then much progress has been made in studying its influence and relation to other heavenly bodies, and spectrum analysis has aided in determining to a large extent its general constituents.

The mean distance of the sun from the earth is placed at 93,000,000 miles, the diameter at 866,500 miles, and the density at one-fourth that of the earth. Thus the surface is 12,000 and the volume 1,300,000 times that of the earth, but the mass is only 332,000 times as great. The entire mass of the sun is estimated at 750 times greater than that of all other bodies in the solar system, and the period of axial rotation is placed at 25.8 days, being estimated at that figure by the movement of sun spots. However, recent investigations have led to the view that the sun-spot belts have a peculiar surface drift. Until lately it was thought that the portion of the sun visible to the naked eye constitutes the whole luminary, but now it is believed that around that central sphere, technically called the *photosphere,* there are three or four concentric envelopes. These are known as the *chromosphere,* the inner being the *corona* and the upper, the *atmosphere.* Besides these there is probably an outer corona.

It is thought that the *sun spots* are cavities in the concentric envelopes and that they result from unequal velocities of neighboring portions of the solar atmosphere. The sun spots are called *maculae,* and the name *faculae* is applied to the brighter part of the sun surface, while the term *mottlings* is used to designate the parts ranging between the maculae and the faculae. The photosphere exhibits a network of polygonal and other figures when examined under the telescope. Among the figures are pores and domes, the former appearing to be downrushes of vapor, and the latter, luminous clouds. Astronomers assert that there is an immediate connection between the sun spots and rainfall, basing their conclusions upon observations of famines in India for the past thirty years. It is asserted that the absence of rainfall, from which famines result, uniformly occurred at periods when the temperature of the sun showed considerable variations from the normal, the famines following the lower temperatures.

Johann K. F. Zöllner (1834-1882), a German physicist and astronomer, expressed the view that the sun is in a liquid state and that the temperature is sufficiently high to melt a covering of ice equal to forty feet in thickness in a minute, but there is no certainty as to the exact temperature at the surface. Spectrum analysis has proven conclusively that the solar atmosphere contains the following substances: zinc, iron, copper, nickel, cobalt, manganese, titanium, chromium, calcium, sodium, sulphur, barium, hydrogen, potassium, magnesium, aluminum, silver, and cerium. It has been observed that jets of hydrogen are thrown to a height of 175,000 miles in twenty minutes and disappear in thirty minutes, while incandescent hydrogen

clouds reach an altitude ranging from 20,000 to 80,000 miles. The amount of heat proceeding from every square foot of the sun's surface is thought to be equivalent to the mechanical effect of the action of 7,000 horse power, but no approximate estimates of the amount of light sent forth have been agreed upon. The heat of the sun raises vapor from the earth, thus producing rain and supplying necessary elements for the growth of plants and the sustenance of animals. Stored up in coal, it supplies us with fuel, and in many other ways provides essentials to life and industry. The powerful and enduring energy of the sun is supposed to be maintained by meteors falling into it and by a constant contraction of its volume.

SUNBIRD, the name of a bird found in the Eastern Hemisphere, chiefly in the warmer parts. Several species have been described, all of which are small and somewhat resemble the humming birds of America. They feed partly on the nectar of flowers, which they gather by their long bill while perching instead of fluttering in the air. A part of their food consists of insects, chiefly minute forms found within the flowers. The male has a bright plumage during the breeding season, but is somewhat dull at other times. A number of species build their nests in the limbs of trees, roofing them over with tips of the leaves.

SUNBURY, a city in Pennsylvania, county seat of Northumberland County, at the confluence of the western and eastern branches of the Susquehanna River. It is situated 50 miles north of Harrisburg, on the Pennsylvania and the Philadelphia and Reading railroads, and has a growing trade in coal and merchandise. The surrounding region produces lumber, coal, cereals, and fruits. The notable buildings include the county courthouse, the Mary M. Packer Hospital, the public library, and many churches. Among the manufactures are flour, nails, carpets, furniture, cigars, clothing, and machinery. It has electric street railways, waterworks, and sanitary sewerage. It was settled in 1772 and incorporated in 1797. Population, 1920, 15,721.

SUNDA ISLANDS (sŭn'dȧ), a chain of islands in the Malay Archipelago, situated between the China Sea and the Indian Ocean. They are divided into the two groups known as the Lesser Sunda and the Greater Sunda islands. The former includes Bali, Flores, Lombok, Ombai, Sumbawa, and a number of others, while the latter embraces Banca, Borneo, Celebes, Java, Madura, and Sumatra. These islands are so named from the Sundanese, a race of Malayans, who somewhat resemble the Japanese. All the islands, except a part of Borneo, belong to the Netherlands.

SUN DANCE, an annual religious ceremony practiced by many tribes of the American Indians, as a thanksgiving to the sun god. Formerly the ceremony was accompanied by extreme fasting and tortures, but they are no longer permitted, although the sun dance still survives among the Sioux, Cheyenne, and other tribes. The management is in charge of certain priests and warriors and the ceremonies continue about a week, but the dance proper is conducted only about four days and nights. A period of fasting usually precedes the dance, and those who take an active part are partly stripped and painted. The dancers take their position in a half circle about a pole at the center, at the top of which is a sacred object, and they constantly look upward so as to face the sun. Between the teeth is a whistle fitted to produce a shrill sound, and the songs of the sun dance are chanted to the beating of a powerful drum. Within the lodge of the medicine man is the sacred pipe and other ceremonial objects. The dance is interspersed with feasting, addresses, and the initiation of new members into the societies.

SUNDAY, the first day of the week, kept as the sabbath among most Christians in remembrance of the resurrection of Christ. Laws for the observance of Sunday were enacted as soon as the Christian religion was recognized, and Constantine, in 321, prohibited all business on that day, except necessary agricultural labor and the manumission of slaves.

SUNDAY, William Ashley, evangelist, born at Ames, Iowa, Nov. 19, 1863. He studied in the high school and at Northwestern University, was a professional ball player from 1883 until 1890, and was assistant secretary of the Chicago Y. M. C. A. from 1891 until 1895. In the meantime he was ordained as Presbyterian minister, but devoted his time almost exclusively to evangelistic work, in which he gained a very wide acquaintance and attained much influence for prohibition and Christian endeavor.

SUNDAY SCHOOLS, the organizations maintained for the purpose of giving instruction in religion to the young. They are held either on Sunday or on the Sabbath. The Protestant denominations commonly have their Sunday-school meeting immediately preceding or following regular services on Sunday, but the denominations that keep Saturday as the day for regular worship hold them on Saturday, and usually denominate them Sabbath schools. The patriarchs of ancient times conducted family instruction for the children, and with the early rise of Christianity religious teachings were given alike to old and young. Instruction of the young in religious matters was greatly neglected in the Middle Ages, but with the beginning of the Reformation it became apparent that the preservation of Christian practices is quite impossible without some systematic organization that will direct religious conduct and tenets.

Martin Luther was the first Protestant leader to organize Sunday schools, and those instituted by him and his fellow-reformers resulted in a general awakening of religious thought. Entire schools were frequently made up of adults, who attended them with devoted eagerness to read

and study the Bible, and at that time many of the schools for children necessarily taught the rudiments of reading before religious instruction could be comprehended. Sunday schools were first organized in England by Robert Raikes, publisher of the Gloucester *Journal,* who, in 1781, formed several local organizations in the poorer districts of his city, largely with the view of overcoming widespread profanation of the Sabbath. These children were employed during the week in factories, and on the Sabbath spent their time in idleness and play. Hence, the Sabbath school became a source of great blessing to them and the community. Teachers were at first employed for twenty-five cents a day and the children were kept in the Sunday school the entire day, except the brief period they attended church services.

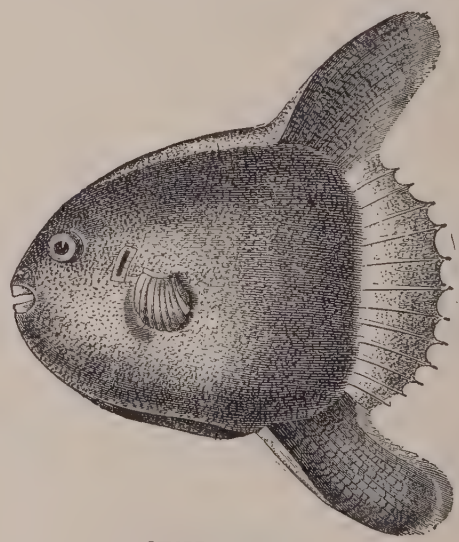
The popularity and value of these organizations spread rapidly and brought forward many volunteer teachers, a plan that is at present in vogue in all Sunday schools. In 1784 Raikes published an article in the *Gentleman's Magazine,* in which he minutely described the organization and objects of Sabbath schools, thus calling general attention to these institutions. Rowland Hill in the same year established the first Sunday school in London, and by 1789 about 300,000 Sunday school members were enumerated in Great Britain. The Philadelphia Society for the Support of Sunday Schools was organized in 1786 with the view of effecting organizations whereby children could be gathered into Sunday training classes. Schools were soon started in Boston, New York, and other cities. The New York Sunday-School Union was organized in 1816, and the American Sunday-School Union in 1824. At present all the Protestant evangelical churches have Sunday-school organizations. The non-evangelical and Roman Catholic churches give religious instruction to the young either in Sunday schools or in parochial schools maintained largely for the same purpose. In many communities both classes of schools are maintained. The latest figures place the Sunday schools in the United States at 140,680, with 1,503,640 teachers and 11,682,832 pupils. In 1922 Canada had 20,890 Sunday schools, with 86,640 teachers and 702,680 pupils. The Sunday schools of the world are estimated at 268,840, with 2,875,550 teachers and 26,545,780 scholars.

SUNDERLAND (sŭn'dẽr-land), a seaport city of England, in Durham County, thirteen miles northeast of Durham. It occupies a convenient site at the mouth of the Wear River, has extensive railroad facilities, and has a commodious and safe harbor. Sunderland has a large export trade in coal and imports of grain, timber, and raw material for manufacturing purposes. Shipbuilding is an extensive industry. Among the manufactures are cordage, ironware, sailing vessels, anchors, earthenware, glass, engines, and machinery. The city contains a number of excellent public buildings, among them an orphan asylum, an infirmary, numerous hospitals, and excellent educational and scientific institutions. It has a fine public library and several parks, the latter including People's Park, with a monument built in honor of Havelock. Several bridges across the Wear River connect the two parts of the city, each of which has extensive docks and fishing stations of considerable extent. The region surrounding Sunderland is one of the most productive coal districts of England. The surface is fertile, producing fruits, grasses, vegetables, and cereals. Two stone piers with lighthouses are situated at the entrance of the harbor. The city dates from the early part of the 14th century, but its commercial importance commenced with the last century, when the Durham coal trade began to develop. Population, 1921, 151,162.

SUNDEW, a genus of plants native to America, found chiefly in bogs and marshes. The common sundew has rounded leaves that spring from the root, forming a rosette, and in the center is a tall stem with a raceme of flowers on one side of the upper part. The leaves are fringed and covered with hairs, which secrete a sticky fluid. When small insects come in contact with the hairs, they are caught and held firmly by the enfolding hairs, and are digested through the action of the secretion.

SUNDIAL. See **Dial.**

SUNFISH, a genus of marine fishes of the family *Diodontidae.* They are so called from the compressed form of the body and because



SHORT SUNFISH.

of their habit of coming to the surface when the sun shines. The body is short and of a circular form, terminating in a short and abrupt tail. They have two large fins, a dorsal and an anal, by which they move through the water in a vertical position. In some instances they

effect movement by rolling the body over and over. Only two species are known, the short sunfish and the oblong. The *short sunfish* is quite round when young, but its body gradually assumes a compressed form and attains a length of three to seven feet. The *oblong sunfish* is somewhat larger, its body attaining a diameter of from eight to twelve feet. These species occur in all the seas. The sunfishes have a leathery skin and soft, white flesh. An oil useful in medicine is secured from the liver. Sunfishes have no swimming bladder or teeth, cutting edges of bone serving instead of the latter. The name is sometimes applied to several species of small, flat fishes common to streams and lakes.

SUNFLOWER (sŭn'flou-ĕr), a genus of plants of the aster family, which have large, cordate leaves and terminal, flat, circular heads

SUNFLOWER.
A, Single floret; *B*, Seed.

of flowers. They are herbaceous plants. About fifty species have been described, all of which are native to America. The stems of some species attain a height of six to fifteen feet, and the larger heads have a diameter of twelve inches. The size of the flowers depends on pruning off a number of the buds, usually two or three being sufficient to develop the largest form. Sunflowers are cultivated in many sections of Canada and the United States for ornamental plants and for their seed, which is valuable for cage birds and domestic animals. They are grown in fields in Southern Europe, where the flowers yield excellent food for bees and the seeds are used to feed cattle and poultry. Both annual and perennial species are grown and all bear yellow flowers. Fertile and well cultivated land yields from 30 to 48 bushels of seed to the acre. The seed contains 16 per cent. of protein and 21 per cent. of fat. These plants are so named from the ideal resemblance of the large flowers to the golden rays of the sun, with which they were formerly believed to move as that luminary passes through the heavens.

SUNNITES (sŭn'nīts), the orthodox sect of Moslems, so called from their adherence to the *Sunna*, or tradition of prophetic laws. They are distinguished in this respect from the Shiites, or heterodox Mohammedans. The Sunna embraces three distinct departments, including the remarks and counsels of Mohammed, his deeds and practices, and his silence upon certain usages. The last mentioned is looked upon by the Sunnites as an indication that the Prophet made manifest his opinion by abstaining from doing or saying certain things, hence his silence holds an important place in the doctrines of this sect. The Sunnites are the largest branch of Mohammedanism and have their following chiefly in Persia, Asia, Turkey, and Syria. They are subdivided into four sects known as Hanifites, Hanbalites, Malikites, and Schiites.

SUNSTROKE (sŭn'strōk), a very dangerous affection of the nervous system, caused by exposure to the direct rays of the sun, especially in the tropics and in the hottest part of the year in the Temperate zones. It is especially frequent and dangerous among overworked and badly fed soldiers under exposure to heat, and is quite common in the large cities and in harvest fields. The early symptoms resemble those attending simple apoplexy, commencing with faintness, abnormal heat, thirst, dryness of the skin, and prostration. Later the action of the heart becomes violent and the temperature may rise to 115° Fahr., which is sometimes followed by vomiting, and finally coma results. It has been found that from 40 to 50 per cent. of those attacked by sunstroke die, and that those recovering are quite generally impaired in bodily health or mental vigor.

SUN WORSHIP, a form of nature worship which dates from remote antiquity. It was practiced throughout the period of human history to a considerable extent among peoples somewhat higher in the scale of civilization than the nomadic tribes. In this form of religious worship the sun and moon are regarded as com-

panions, sometimes as brother and sister or husband and wife, and they are held to be the rulers of the earth. It was the chief worship among the Aryan tribes, from whom it descended to certain classes of Brahmans, and is still practiced in some parts of India. The ancient Persians connected their god Mithra with the sun, as also did the Greeks their Helios and the Egyptians their Ra. The Spanish conquerors of Mexico found a people who maintained splendid temples dedicated to the sun, among whom the priests of the sun were the predominating influence. Sun worship flourished in Peru and to some extent among the Indians of North Ameria. The Peruvians held the sun to be the ancestor and founder of the dynasty of the Incas, who made sun worship the state religion and reigned as the representative of the sun god.

SUPERIOR, a city in Wisconsin, capital of Douglas County, on Lake Superior, seven miles south of Duluth, Minn. Communication is furnished by the Northern Pacific, the Chicago and Northwestern, the Great Northern, the Duluth, South Shore and Atlantic, and other railroads. It occupies a fine site at the mouth of the Saint Louis River, on three bays or inlets of Lake Superior, and has a well-sheltered harbor. Bridges, ferries, and electric street railways connect it with Duluth. The streets are regularly paved and improved by sewerage, pavements, waterworks, and gas and electric lighting. It has manufactures of lumber, brick, ironware, furniture, machinery, and farming implements. The trade in coal, lumber, wheat, and merchandise is very extensive, the city having abundant facilities to handle large quantities of these commodities. It has large flouring mills, wharves, and shipyards.

Superior has many large and substantial buildings, the construction being chiefly of brick and stone. They include the county courthouse, the public library, the two high schools, the Saint Mary's Hospital, the business college, and many business blocks and churches. It is the seat of a State normal school. The vicinity was visited by Du L'Hut in 1680, when he established a trading post here, but it was not platted until 1855. In 1881 the Northern Pacific Railway was built to this place and four years later it became a city. Population, 1920, 39,624.

SUPERIOR, Lake, the most westerly of the Great Lakes of North America, the largest body of fresh water in the world. It is bounded on the south by Michigan and Wisconsin, and its other boundaries are formed by Minnesota and Ontario. The length from east to west is 415 miles; greatest breadth, 165 miles; and the area, 31,200 square miles. It has fully 1,760 miles of coast line, the principal inlets in the United States being White Fish, Keweenaw, and Chaquamegon bays. The lake surface is 602 feet above sea level. The mean depth is given at 480 feet and the greatest depth at 1,010 feet. Lake Superior receives the drainage of an area equal to only 85,000 square miles, this being due to its location near the watershed between the Mississippi River and Hudson Bay. Many small streams flow into it, the most important being the Saint Louis, Pigeon, Nipigon, Flag, Union, and Fire Steel rivers. Within it are many islands and island groups, including the Apostle Islands, Isle Royale, Manitou, and Grand, under United States jurisdiction, and Caribou and Michipicoten under that of Canada. Keweenaw Point is the most important projection into the lake. It comprises the County of Keweenaw and a part of Houghton, in the State of Michigan.

The southern shore is generally low and sandy, but has a number of remarkable cliffs, among them Pictured Rocks, 300 feet high. The northern shore is formed quite largely of cliffs ranging from 200 to 1,500 feet above the lake. A line drawn from Saint Mary's River to a point north of Isle Royale, and thence to the mouth of the Pigeon River, constitutes the boundary between the United States and Canada. Lake Superior is remarkable for its clear water. It has valuable sturgeon, trout, whitefish, and other fisheries. Copper and iron deposits of vast value abound on its shores and many of the islands, especially in the vicinity of Duluth, Superior, Houghton, and Port Arthur. It is important as a route of trade and travel in the summer season, particularly in transporting grain, live stock, lumber, coal, copper, iron, fish, and manufactures. The Saint Mary's River, at the southeast end, is the only outlet, connecting it with Lake Huron.

SUPERNATURALISM (sū-pẽr-năt'ū-rạl-ĭz'm), the doctrine of a divine agent in revealing to mankind a knowledge of God, in the grace which renews and sanctifies men. It stands in opposition to the doctrine that physical or natural causes are the agencies which thus influence. The term *rationalism* stands in contradistinction to supernaturalism. It maintains that reason must be exercised in judging religion. According to supernaturalism, the miracles and revelations recorded in the Bible were wrought by a divine and supernatural influence. See **Miracle.**

SUPREME COURT. See **Courts.**

SURABAYA (sōō-rà-bä'yà), or **Soerabaya,** a city of Java, on the Strait of Madura, near the mouth of the Romo River. It is the largest Javanese city. The surrounding country is fertile, producing fruits, sugar cane, cereals, and spices. The manufactures include tobacco and cigars, furniture, clothing, sugar, rum, and textiles. It is the seat of a mint, an arsenal, a cannon foundry, and several government buildings. A number of the streets are paved and they are generally lighted with electricity. Waterworks and a sewerage system have been established. The city has a large trade with Holland, to which country it belongs. Population, 1922, 147,822.

SURAKARTA (sōō-rà-kär'tà), or **Soerakarta**, a city of Java, capital of a government of the same name, situated about fifty miles south of the city of Samarang. It occupies a fine site on the Solo River and is the seat of many beautiful palaces and temples. The government of the Netherlands maintains several schools in the European part of the city, including a normal school for training Javanese teachers and a military academy. The city has a number of hospitals, a citadel, and numerous churches. A railroad line extends from the city to Samarang, thus facilitating the transportation of produce to the coast. Population, 1922, 100,695.

SURAT (sōō-rät'), a city of India, in the Bombay presidency, on the Tapti River, 150 miles north of Bombay. It is surrounded by a rude wall of brick, has ample railroad facilities, and produces clothing, cotton and woolen goods, toys, earthenware, cigars, and machinery. Surat has a large trade in cereals, cotton, live stock, and merchandise, much of which is export trade. Among the principal buildings are those maintained by the British government, several Hindu temples and Mohammedan mosques, an old citadel, and a number of schools, hospitals, and churches. Surat was a fishing village in the 13th century, but soon after rose to prominence as the place from which the Mohammedans embarked for their pilgrimages to Mecca. The Portuguese came in possession of it in 1512 and it was afterward held by the Dutch and French, but in 1800 was annexed to the English possessions. Though of considerable military and commercial importance, it is not as enterprising as it was at the beginning of the last century, when it had a population of three-quarters of a million. Population, 1922, 120,063.

SURGERY (sûr'jĕr-ў), the branch of the medical practice that relates to external injuries, deformities, and other morbid conditions to be treated directly by manual operations or by the application of instruments. It was practiced with success among the Egyptians about 410 B. C. Surgical instruments for reducing dislocations of the bones are mentioned by Hippocrates, the celebrated Greek physician and writer of six surgical treatises, in the early part of the 4th century B. C. Grecian surgeons were the most skilled of the ancient practitioners, and by them surgery was introduced in Rome. Considerable progress in surgery was made in the prosperous period of Arabia. Andrew Vesalius (1514-1564), a native of Basel, Switzerland, is considered the founder of modern surgery, owing largely to his successful practice and an excellent treatise published by him in 1543.

The more correct views of the circulation of the blood published by Harvey, in 1616, and his lectures on surgery, aided greatly in developing the practice. The invention of improved surgical instruments by Fabricius, of Hilden, Germany, gave practitioners valuable assistance in treating complicated organs, such as the urethra and the ear. Others eminent in the surgical practice include John Hunter, Ambrose Pare, Pasteur, and Von Gräfe. A multiplicity of instruments is employed in modern surgery. Among the most recent additions of value to the practice are skin grafting, nerve stretching, successful excision of cancerous affections, radical cure for hernia, and the invention of instruments and the discovery of medicines rendering operations less painful and much more effectual. The discovery of the Röentgen, or X-Ray, and radium, have added materially to the efficiency of surgical practice. See **Anaesthetics; Antiseptic; Bacteriology; Medicine; X-Ray.**

SURINAM (sōō-rĭ-näm'), a river of South America, in Dutch Guiana. It rises in the mountains of the south central part, has a general course toward the north, and discharges into the Atlantic 16 miles below Paramaribo. The entire length is 380 miles. It is navigable for the largest vessels about 40 miles and for ships drawing ten feet for about 100 miles. Valuable forests abound in the valley of the Surinam. Farming is carried on extensively between Paramaribo and the ocean. The Cottica River, a navigable channel, joins the Surinam near its mouth.

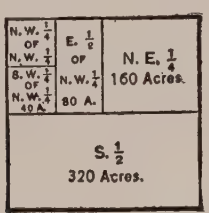
SURMULLET (sûr-mŭl'lĕt), the name of a species of mullet found in the tropical seas. It is a common fish in the Mediterranean, where it obtains a weight of from six to ten pounds. The flesh is highly esteemed for food and was prized as an article of commerce by the ancient Romans.

SURREY (sŭr'rĭ), a light vehicle with four wheels, usually provided with two seats and drawn by one or two horses. The body is box-shaped and is built somewhat like that of a phaëton.

SURREY, Henry Howard, Earl of, soldier and poet, born in Suffolk, England, in 1517; executed Jan. 21, 1547. He was the eldest son of Thomas Howard, third Duke of Norfolk, and in 1532 accompanied Henry VIII. to France, where he spent some time in study. In 1544 he was made a commander of the English army in France. He was wounded at the siege of Montreuil, and in the following year was superseded by the Earl of Hertford. Subsequently he made an extended tour of Italy, where he became passionately fond of poetry, and on returning to England spent much time in writing sonnets after those of Italian authors. Surrey and his father were suspected of designing to acquire the throne of England even before the death of Henry VIII., and he was arrested and imprisoned at the Tower on a charge of high treason. Defense was in vain before the partial court, and he was accordingly condemned and beheaded. Surrey was among the first to write in the form of polished blank verse, a style

that so strikingly distinguishes the language of Shakespeare and Chaucer, and to him we owe the introduction of the sonnet. It is to the new metrical form and style in which his poetry was written, rather than to the poetry itself, that his writings are counted of literary importance.

SURVEYING (sûr-vā'ĭng), the science of determining the area and configuration of portions of the surface of the earth and representing them on maps. It is a branch of applied mathematics and includes land surveying and marine surveying. *Land surveying* is the art of applying the principles of geometry and trigonometry to the measurement of land, either on a small or a large scale. *Marine surveying* has reference to the measurement of shoals, coasts, and harbors, including a complete determination of the contour of the bottom of a



SUBDIVISIONS OF THE SECTION.

harbor or other bodies of water. In *plane surveying* the surface is looked upon as a plane; this form is used in measuring small areas. *Geodesic surveying* is employed to determine the latitude and longitude of places and the relative length of terrestrial arcs in different latitudes. This art or science is called *geodesy*. *Topographical surveying* involves all the operations incident to finding the contour of a portion of the earth's surface, such as hills, valleys, water courses, and embankments, and the various methods of representing them upon a plane surface. *Hydrographical surveying* is the term employed to designate the surveys which locate inlets, shore lines of harbors, and other matters incident to coast lines. A *reconnoissance survey* is one hastily made for military and other purposes. *Railroad surveying* embraces surveys intended to ascertain the best line of communication between two given points. *Mining surveying* relates to the determination of the situation and position of the shafts, galleries, and other underground excavations of a mine already built, or surveys for the construction of mines not yet opened. The principal operations in surveying land include laying down base lines and driving triangles on either side of the base. Among the instruments used are the Gunter's chain, for measuring the linear dimensions to ascertain the area of a given tract of land; the theodolite, for determining the accuracy of angles; the surveyor's cross, for raising perpendiculars; and instruments known as the transit, plane table, zenith sector, azimuth, etc.

When the early settlements of America were founded, the claims to land were governed largely by streams, hills, and other natural demarkations, thus making the individual possessions quite irregular in outline. Soon after the establishment of the nation under the Constitution, and before it had acquired new territory, a general system of surveys for all public lands was devised. Accordingly all land owned and offered for sale by the general government was laid out in townships, each six miles square, as nearly as the spherical form of the earth's surface would permit.

In surveying a tract of country the government, both in Canada and the United States, first establishes a line in a north-south direction, called the *principal meridian*, and then a line crossing it at right angles, parallel to the Equator, called the *base line*. Lines six miles apart are next run in both directions, those parallel to the principal meridian forming the *range* and those parallel to the base line the *township*, each being numbered consecutively from the point of beginning. A tract six miles square is called a township and consists of 36 sections. Each section is one mile square, thus containing 640 acres. The sections are numbered from 1 to 36 and are subdivided fractionally, as shown in the diagram. In describing land it is customary to give the fractional parts of a section, as the south half, the east half of the northwest quarter, the southwest quarter of the northwest quarter, etc. Interference in regularity by the curvature of the earth's surface and the contour of the region surveyed requires correction lines at the north and west sides of each township, where the sections are usually fractional, while all others are intended to include the exact number of acres in a section of regular size. Sections 16 and 36 were set apart for school purposes in some States.

SUSA (sōō'sà), an ancient city of Persia, which was situated on a plain near the Karun River, a stream flowing into the Persian Gulf. It is mentioned as Shushan in the books of Daniel and Esther, and is thought to have occupied a large tract near the modern village of Sus. Tracings of its name and plan have been discovered on Assyrian monuments dating from the reign of Assur-bani-pal, about 600 B. C., when it formed a part of Babylonia, but later it came under the Persian rule of Cyrus. Subsequently it became the capital of Persia and was the seat of great riches. When Alexander the Great conquered it, in 325 B. C., he obtained vast treasures of gold, silver, and precious stones from its palaces and citadels, and in 315 B. C. it fell under the control of Antigonus. It was so completely destroyed soon after by the Arabs that even its site was forgotten. Recent excavations have led to a discovery of the lost city. Among its extensive ruins are traces of the

palace described in Esther. In several places on its former site are remains of monuments bearing numerous cuneiform inscriptions.

SUSQUEHANNA RIVER (sŭs-kwẹ-hăn′-ná), an important stream of Pennsylvania, which is formed in Northumberland County by the union of its eastern and western branches. The eastern branch rises in Otsego Lake, in southeastern New York, and is 250 miles long; while the western branch has its source in the Allegheny Mountains of Pennsylvania, and has a length of 200 miles. The main stream of the Susquehanna has a course of 150 miles, extending from the union near Northumberland in a southwesterly direction until it is joined by the Juniata, when it assumes a southeasterly course and flows into Chesapeake Bay. The branches afford fine water power and both they and the main stream have valuable fisheries. The Susquehanna is a wide and shallow stream and is navigable only during high water in the spring, when large rafts of logs are floated down the current. Among the cities on its banks are Harrisburg and Wilkesbarre, in Pennsylvania, and Oswego and Binghamton, in New York.

SUTLEJ (sŭt′lĕj), a river of northwestern India, one of the five great rivers in the Punjab. It rises in an elevated lake of Tibet and flows through the Himalayas, where the sides of its narrow gorge attain a height of several thousand feet. The general course is toward the southwest, entering the Indus River at Mithankot. It is known as the Ghara River below the confluence with the Beas. The entire course is 875 miles.

SUTTEE (sŭt-tē′), a form of funeral sacrifice formerly practiced among certain castes of India, but now prohibited by statutory law. The sacrifice consisted of the widow being burnt with her dead husband on the funeral pyre, but, if he died at a distance, the widow was sacrificed on a pyre erected for that purpose. Evidences have been collected to prove that suttee was enforced as early as the invasion of Asia by Alexander the Great, and that the practice originated from a mistaken notion of the Vedas and other Hindu books. Many of the widows met the obligation with cheerful alacrity, but others were driven to it by fear of disgrace or priestly threats, and in some cases by sheer violence. It was instituted as a religious rite from the notion that great men should be accompanied into the other world by their wives, weapons, horses, and favorite jewels, either by having them burned or buried along with the deceased. In the period between 1813 and 1828 the suttees in Calcutta alone numbered annually from 300 to 600. When the question of prohibiting it was under discussion, the Brahmans quoted the Vedas in favor of the practice, but several European scholars had shown conclusively that the text had been misunderstood and falsified. The practice was prohibited by law in British India on Dec. 4, 1829, but it is still secretly consummated in some of the principalities by the natives of certain castes and descendants of ancient families.

SUVAROFF (sōō-vä′rôf), **or Suvoroff, Alexi Vassilievitch,** soldier, born in Moscow, Russia, Nov. 24, 1729; died May 18, 1800. He descended from Swedish parents and entered the army of Finland. For several years he served in the Seven Years' War, taking part in the Battle of Kunersdorf in 1759, and took part in the Polish War of 1768 to 1772. In the war against the Turks, from 1773 to 1774, he won several battles and was commander in chief in the second Turkish War, beginning in 1787. He captured the fortress of Ismail in 1790, where a large number of Turks were slain. Joseph II. of Austria created him a count of the empire for his victory at Rymnik, in 1789, which saved the Austrians under the Prince of Saxe-Coburg from capture. In 1794 he operated in Poland, where he defeated a native army under Kosciuszko and occupied Warsaw. He defeated an allied army of French and Italians at Cassano in 1799 and marched to Switzerland with the hope of joining Korsakoff, who was defeated by Masséna at Zurich. This compelled him to retreat, and he was recalled and made commander in chief of the Russian armies. The title of Prince Italiski was bestowed upon him.

SWABIA (swā′bĭ-à), **or Suabia,** in German *Schwaben,* an ancient duchy of southwestern Germany, so called from the Germanic Suevi, a class of people who occupied it in the 5th century. It had been called Alemannia previous to that time, from the Alemanni, its inhabitants before the Swabian invasion, who had driven out the Celts in the 1st century B. C. Swabia included about 13,000 square miles in the 5th century, when the Swabians and Alemanni were united under Swabian dukes. In 1080 the region became a possession of Count Frederick of Hohenstaufen, who made it the nucleus of Germany, and for centuries it was the most powerful and progressive of the German possessions. After the extinction of the Swabian line, the country became involved in prolonged wars, and from 1512 until 1806 it formed one of the ten circles into which Germany was divided. The most disastrous wars were the Peasants' War of 1525 and the Thirty Years' War from 1618 to 1648. The duchy is now divided among Hohenzollern, Baden, Bavaria, Württemberg, and Lichtenstein, though Württemberg possesses the larger part. A division of Baden called Swabia has an area of 3,732 square miles. The seat of government is at Augsburg.

SWALLOW (swŏl′lō), an extensive genus of birds found in all parts of the world. They are distinguished by a short, depressed bill with a wide gape, long, pointed wings, the tail more or less forked, and weak feet. Swallows are birds of powerful flight and spend more time on the wing than other birds. It is not unusual to see them soaring high in the air, describing

great circles, usually flying singly and uttering shrill screams. They feed chiefly on insects, which they catch while flying, and some species even scoop water from the surface of ponds and streams while on the wing. The nests are built of straw and feathers, usually under the eaves of buildings and on rocks, and some species find a home in small houses built for that purpose.

The *common swallow* is native to Europe, Asia, and Africa. It attains a length of about

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nine inches and has a steel-blue color on the back and wings, with reddish markings below. It is frequently called *chimney swallow* from its habit of building nests near the chimneys of houses, where it lays its eggs and rears the young. Two broods are produced in a year. This species migrates to the warmer parts in the winter, and its return to Western Europe is a harbinger of spring. The song is a mere twitter, which is heard most frequently as the birds gather in large flocks in autumn to migrate. The *sand martin* is a species widely distributed in America and Europe. It has brownish plumage and is found largely along sandy banks of rivers and in sandpits, where it excavates galleries for nesting purposes. These galleries are often three to five feet long, more or less tortuous, and are excavated with the bill. The *purple swallow* is widely distributed in America and is so named from its purple-bluish color. Other species include the *cliff swallow* of North America, the *fairy martin* of Australia, and the *window swallow* of Europe. Swallows, like owls, eject the undigested portions of their food in small pellets or castings. They closely resemble the swifts, which are often mistaken for swallows, and also the sea-swallow, or tern. The fairy martin of Australia is a small species, and, like the allied species of China and the East Indies, builds flask-shaped nests that are gathered and sold in the market as edible and highly favorite food. This food is dissolved in water and used in preparing gravy and soup.

SWAMP. See **Marsh; United States,** subhead AGRICULTURE.

SWAMPSCOTT (swŏmp'skŏt), a town of Massachusetts, in Essex County, twelve miles northeast of Boston. It is on the Boston and Maine Railway and is finely situated near the shore of Massachusetts Bay, hence is popular as a watering place. The chief buildings include the public library, the townhall, the Phillips School, and many fine hotels and summer residences. It has electric lighting, sewerage, and waterworks. In 1925 it was the summer home of President Coolidge. Population, 1925, 8,953.

SWAN, a genus of web-footed birds of the duck family. They are among the largest and most beautiful of aquatic birds. Naturalists recognize a number of well-marked species, more or less widely distributed, and they are migratory in a wild state. The neck is long and arched and when swimming it is bent in an S-shaped curve. Swans have a hiss resembling that of geese, which is heard chiefly when the bird is disturbed. They defend themselves by striking blows with the wings. Young swans are called *cygnets* and have a bluish-gray color, with a dark-hued bill. When full grown, the *common swan* measures about five feet and weighs fully thirty pounds. The feathers are a pure white, and it takes great pride in washing and keeping them clean. This species is native to the northern and western parts of Europe, whence it moves in the fall toward the tropical regions. It has been domesticated as an ornamental bird for gardens and parks, for which purpose it is kept extensively in America and all the European countries.

The *American swan* breeds in the northern part of North America, usually laying ten to twelve eggs in the rushes near the water, and in the fall moves southward to the Carolinas. While its appearance is much like that of the common swan, it is somewhat smaller. It is remarkable that all the species of swans native to the Northern Hemisphere are white, while those of the Southern Hemisphere are black or have black markings. The South American

black-necked swan is white, but has a black neck and a bright red knob at the top of the bill. It has been domesticated and is reared as a park or barnyard ornament. The *black swan* of Australia is black with white markings and has a reddish bill. It is usually seen in flocks of eight or ten. It has been tamed and is grown to some extent. An American species called the *trumpeting swan* is noted for its musical cry and is singular for having a large

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cavity in the breastbone in which the windpipe coils before passing to the lungs. Swans were formerly eaten to a considerable extent, but are now reared only on a limited scale for ornament and their feathers. The female lays from five to ten eggs, which are hatched in six weeks. It was once erroneously supposed that the swan sings a song just before dying, called the *song of the dying swan.*

SWANSEA (swŏn′sē), a seaport city of Wales, in the County of Glamorgan, at the mouth of the Tawe River, 43 miles northwest of Cardiff. The harbor in Swansea Bay, an inlet from Bristol Channel, is well improved by wharves and masonry. It has communication by steam and electric railways. The surrounding country is noted for its extensive deposit of coal, thus making it a favorite point for smelting ores brought from the mines of England. It has extensive manufactures of cordage, pottery, leather, ironware, tin, tar, sailing vessels, chinaware, and spirituous liquors. Swansea has an extensive export and import trade, fully 2,500 vessels entering the port annually. Among the leading buildings are the customhouse, numerous hospitals, and several fine educational and religious institutions. Anciently it had a fine castle, but this structure was dismantled in 1647. Population, 1921, 114, 673.

SWEAT, or Perspiration, the fluid which is exuded through the pores of the skin. The glands that secrete sweat are made of tubes that are twisted in the form of a knot, leading to a surface by a somewhat spiral duct. At the surface of the skin these ducts terminate in openings called *pores.* The sweat consists of water with numerous solids in solution, is saltish to the taste, and serves to expel certain waste materials which collect in the blood. The effect of sweating is both to cool and cleanse the body. It is estimated that from one to four pounds of this fluid pass away from the skin in 24 hours. The portion which is evaporated as fast as it is carried to the surface of the skin is called *insensible perspiration* and that which accumulates on the skin is termed *sensible perspiration.* In some diseases, as in rheumatism and tuberculosis, the sweating is profuse, while in some fevers it is greatly diminished. The former condition is called *hyperidrosis,* while the latter is termed *anidrosis.*

SWEATSHOP SYSTEM, the name applied in certain classes of manufacturing, especially those in which the work is done in the homes or in small workshops at very low wages. Factory labor is not subject to it, since it is more highly skilled and adapted to the use of modern methods and machinery. In most cases it embraces the older methods of doing the work in small shops, a survival of ancient methods, in which the workers are in competition with the newer systems. Sometimes the laborer is employed and contracted to a subcontractor, or sweater, who makes a small margin of profit between the wages paid to the workers and the contract prices established as a standard. It has been more common in the manufacture of clothing and cigars than in any other lines. Legislation has been directed against this system in many countries, with the view of prohibiting the employment of children and improving the sanitary conditions of the smaller and overcrowded workshops. Trades unions and the establishment of larger corporations have done much to relieve the unfavorable conditions formerly very harmful to the health of laborers.

SWEDEN (swē′dẹn), called *Sverige* in Swedish, a kingdom of Northern Europe, occupying the eastern part of the Scandinavian Peninsula. It is bounded on the west and north by Norway, east by Russia, the Gulf of Bothnia, and the Baltic Sea, and south by the Baltic Sea, the Cattegat, and the Sound. The length from north to south is 965 miles, the breadth is from 150 to 225 miles, and the area is 172,878 square miles. It is formed of three principal divisions, which are Norrland in the north, Svealand in the center, and Gotland in the south. The coast line of 1,375 miles is deeply indented by gulfs and the mouths of rivers. To Sweden belong many islands of the Baltic Sea, including Oland and Gotland, and the Aland Archipelago.

DESCRIPTION. Sweden is separated from Norway by the Kiolen Mountains, or Scandinavian Alps, but these highlands are chiefly in Norway, where they are more rugged and precipitous in character. In Sweden they form a plateau about 4,000 feet high, from which occasional peaks rise to a greater altitude. From the boundary these highlands slope gradually toward the east

and decline into hills of moderate elevation to the seashore. Sarjektjakko, 6,850 feet, and Kaskasatjakko, 6,810 feet, are the highest summits. The greatest elevations are in the northwest, where Kebnekaisse attains a height of 7,004 feet. In the southern part the country is very level. Here the great plain of Scania, the most fertile tract of the peninsula, covers considerable territory. The northern part is bleak and rocky and barren and snowclad hills give the country a grand aspect.

The drainage is chiefly toward the east and south into the Gulf of Bothnia and the Baltic. While the rivers afford much water power, they are too rapid for extensive navigation. The Tornea and its largest northern tributary, the Lainio, form the boundary with Russia. Among the rivers that flow into the Gulf of Bothnia, passing in their order southward, are the Kalix, the Lulea, the Pitea, the Skelleftea, the Gidea, and the Indals. The Dal Elf is the largest river that discharges into the Baltic. Lake Wener, which receives the Klar Elf, discharges through the Gota Elf into the Cattegat. The beds and banks of the rivers are more or less rocky and many are connected with the lakes that fairly dot many parts of Sweden. Vast canal improvements have rendered the lakes of great utility for inland commercial enterprises. Lake Wener has an area of 2,014 square miles and other lakes include Wetter, Malar, Tornea, and Hjelmar. These and other lakes are situated in the southern part of Sweden. Stora Lulea is in the northern part.

The climate is colder than in Norway, since the country is shut off from the influence of the Atlantic by the Kiolen Mountains. In the southern part it is quite favorable, but the northern section has an extremely long and cold winter. The summers and winters succeed each other with scarcely an intermission of autumn. At Stockholm the mean temperature is 25° in January and 61° in July, and in the northern part the thermometer falls as low as 40° below zero. The mean annual rainfall is 20 inches, but it is scant in the north and quite abundant in the south, where it is 35 inches. Snow covers the entire country in winter, when the skee and sleigh are used extensively. The climate is singularly healthful in all sections of the country.

Mining. Sweden is rich in mineral wealth, but the output of coal is not sufficient to supply the local demand. This mineral is obtained chiefly in the southern part and the annual output is placed at 275,500 tons. Iron is the most important and valuable mineral product, yielding annually 2,790,000 tons, most of which comes from the district lying north of the Arctic Circle. Since the product is nearly free from phosphorus, the iron of Sweden is unsurpassed in the world, especially for the manufacture of steel. Large quantities are exported to foreign markets. Copper is mined extensively in Falun and large zinc ore mines are worked on the north side of Lake Wetter. Other minerals include alum, lead, manganese, cobalt, silver, and tin. A superior quality of granite is quarried for monuments and construction purposes. Clays, limestone, sandstone, and sand for glass making are widely distributed.

Agriculture. Sweden is less mountainous and broken than Norway and is better adapted to agriculture, which is the leading industry. Fully three-fourths of the inhabitants are engaged in farming and most of the holdings average in size from five to forty acres. The best farming district is in the southern part, where the soil is fertile and the climate quite favorable, and the tilling is conducted with great care. Oats and rye are the chief cereals. Next in order on the basis of acreage are barley, potatoes, wheat, and pulse. Hay is grown successfully and is an important crop. Sugar beets are cultivated in the southern part, since this enterprise receives encouragement by the government. Other crops are flax, tobacco, hops, apples, and small fruits. Cattle raising is the most important live-stock enterprise and dairying is conducted on a high plane. Other live stock includes horses, sheep, swine, poultry, and reindeer.

Manufacturing. The manufacturing enterprises have progressed materially the last decade, owing to aid extended by the government in developing foreign and domestic trade. However, a lack of coal has made it impossible to produce sufficient to supply the demand in the more important lines. Lumber is sawed in large quantities, both for home use and exportation. Textile fabrics, flour and grist, machinery, paper pulp, beet sugar, pipe tobacco and cigars, clothing, and canned and cured fish are the leading manufactures. Stockholm and Göteborg are centers for the manufacture of cotton and woolen goods and large linen factories are located at Norrköping. The steel goods, armor plates, cutlery, and nails made in Sweden are highly esteemed. Motala and Eskilstuna are the principal centers of iron and machine works.

Commerce and Transportation. Sweden has a large coastwise and foreign trade. The imports exceed the exports. Among the leading exports are lumber, minerals, metal goods, oats, and dairy products. The imports consist mainly of wheat, cotton, machinery, coal, and textiles. Foreign trade is carried on chiefly with Great Britain, Germany, Denmark, Russia, Belgium, and Norway. The railway lines in operation equal 9,750 miles, but they are confined largely to the southern part. An important line crosses the northern section, passing through the iron range from the Gulf of Bothnia to West Fiord. About 30,500 miles of telegraph and twice that number of telephone lines are in service. Canal construction received early attention and important connections are thus maintained with the rivers and lakes of the southern part. The

highways are in an excellent condition, many having been improved by grading and paving with macadam.

Government. The government of Sweden is a constitutional monarchy and the crown is hereditary in the male line of descent. If there is no direct heir, the king is chosen by a majority vote of the national legislature, but the choice is limited to a member of the Lutheran Church. Besides having general executive power, the king has important functions in connection with legislative enactments of the diet or parliament, whose decrees he may veto for cause. He is aided by a council of state and negotiates treaties, presides in the supreme court, and nominates military and civil officials. Legislative authority is vested in the diet, known as the *Riksdag,* which consists of two chambers. In the upper chamber are 150 members chosen by provincial and municipal councils for nine years, while the lower chamber consists of 230 members elected for three years by property holders. Every male citizen between the ages of 20 and 25 years serves for a brief period in the national guard, and all over 21 years of age may vote under a limited property restriction. The *krona,* valued at 26.8 cents, is the monetary unit. An army of 36,775 men and officers constitutes the peace footing.

Education. An excellent system of public schools is maintained, with gratuitous admission and a limited compulsory period. The per cent. of illiteracy is remarkably low, practically all inhabitants of school age being able to read and write. Both the common schools and the universities are modeled on the system of Germany. Two excellent universities are maintained, one at Lund and the other at Upsala, and the courses of secondary schools are articulated with those of these institutions. Fourteen normal schools are maintained for the instruction of teachers and many institutions of a charitable and benevolent character have been provided, such as those maintained for the deaf and dumb, feeble-minded, and homeless. Navigation, agricultural, and mining schools are numerous.

Inhabitants. The density of population is thirty to the square mile. Practically all the inhabitants are Scandinavians. Lutheran is the state religion and the people hold chiefly to that faith, though religious liberty is granted to all except the Jesuits. The Roman Catholics number 8,750 and the Jews, 2,300. Stockholm, on an inlet from the Baltic Sea, is the capital and largest city. Other cities include Göteborg, Malmö, Norrköping, and Gefle. Population, 1907, 5,377,713; in 1922, 5,903,684.

Language and Literature. The Swedish people belong to the Scandinavian branch of the Germanic family and are characterized as industrious and persevering. They are largely of a tall, robust stature, and have blue eyes, light hair, and a light complexion. It is probable that their language had its beginning more than 4,000 years ago, but nothing is known of it prior to the Christian era. The dialect is closely allied to that of Norway and less closely to the Danish and Icelandic. German had a wide influence upon the language in the time of the Hanseatic League and the introduction of Protestantism, and a considerable element of Latin was injected through the clergy.

The more recent literature dates from the 13th century, but there is a translation of the Bible, known as the Ulfilas' Gothic translation, which was made in the 5th century and is considered the oldest writing in the Germanic-Swedish tongues now extant. Heroic and chivalric ballads from the 13th century are numerous, while lyrics and biblical translations of the 14th century are quite extensive. In 1478 the University of Upsala was founded, and the art of printing was introduced at Stockholm in 1483. The adoption of Christianity in the 16th century brought hymns and poems into extensive use, but a complete translation of the New Testament was not made until 1526, when that beneficial work was completed by Olaus Petri. Laurentius, in 1541, translated the Old Testament and wrote numerous hymns and poems. "Svensk Kronika" is a historical work written by Olaus, who is the author of a number of dramas. "Captive Cupid" is a poetic production of Stjernhjelm (1598-1672).

Swedish literature was greatly extended in the reign of Gustavus Adolphus, who imported large libraries, founded schools, and invited learned men from abroad to assist educationally. The name of Linnaeus stands preëminent among the naturalists of Sweden and of the world, and both his writings and pupils exercised a wide influence. In the 18th century many theological writers were added to the list. The literary men of that period include Olof von Dalin (1708-1763), Swedenborg (1688-1772), Tobern Olof Bergman (1735-1784), Linnaeus (1707-1778), Celsius (1701-1744), Karl Wilhelm Scheele (1742-1786), who also wrote in German, and Kark Mickel Bellman (1740-1795). Mörk (1714-1763) is an eminent Swedish novelist; Berzelius (1779-1848), a celebrated chemist; Geijer (1783-1847), one of the noted historians; and Tegnér (1782-1846), one of the chief poets. Tegnér's most noted work is called "The Story of Frithiof" and has been translated into many European and Asiatic languages. Fredrika Bremer (1801-1865) is a Finnish poetess who wrote many fine productions in the Swedish. Other eminent poetesses include Baroness Knorring and E. S. Karlén. Victor Rydberg is one of the most recent writers and the author of "The Last Athenian," a famous novel. Edgren is a recent dramatist; Struidberg, a novelist; and Snoilsky, a poet.

History. The early history of Sweden is wrapped in legendry. In the primitive historic stage numerous tribes occupied the different sec-

tions. In the southern part were the Goths, from whom the region is still called Gothland, and in the central part or Svealand were the Swedes. These two groups comprised the most powerful of the native tribes. Christianity was introduced in 829, but the old pagan religion was not overthrown until in the reign of Ingiald (1080-1112), when the temple of Upsala was burned. Eric the Saint succeeded to the throne as ruling sovereign in 1155, and under his direction Christian doctrines were disseminated by the building of churches and schools, but he was slain in 1160 by Magnus Henriksen, a Danish prince. Margaret of Denmark was chosen queen in 1389 and Sweden soon joined the Union of Calmar. In 1523 Gustavus Vasa defeated the Danes and was made king. In 1529 he adopted the Lutheran faith as the national religion. Though he found an empty treasury and an exhausted country, he established the material industries, built cities, and founded highways and institutions of learning. He was succeeded by his son, Eric XIV., who reigned only eight years, owing to a loss of his reason, and his brother ascended the throne as John III. It was the desire of John to restore the Catholic faith, but he died in 1592, to be succeeded by his son, Sigismund. The latter had been brought up in the Catholic faith and followed the course of his father in seeking to restore Catholicism, though he had previously promised to support the Protestant faith, and was accordingly deposed, in 1604, and the crown was given to his uncle, Charles IX.

Charles IX. died in 1611 and was succeeded by his son, the celebrated Gustavus Adolphus, who took a leading part in the Thirty Years' War by invading Germany to defend Protestantism, but lost his life in 1632 at the celebrated Battle of Lützen. The latter had left his noted minister, Oxenstiern, to administer the government in his absence, and he was appointed regent for his daughter, Christina. In 1654 Christina renounced the crown in favor of her cousin, Charles Gustavus, who assumed the title of Charles X. After conducting successful military enterprises in Denmark, Poland, and Russia, he died suddenly and was succeeded by his son, Charles XI., in 1660. This sovereign was only four years old when his father died and thus ruled under a regency until 1680, when he assumed the government. He greatly extended the power of the king, reorganized the army, and encouraged industrial arts. On his death, in 1697, he was succeeded by his son, Charles XII. This military genius conducted extensive operations against Poland, Denmark, and Russia, but was finally defeated at Poltava on July 8, 1709, thus being required to yield to the military superiority of the Muscovites. He subsequently pursued a scheme to conquer Norway, but on Nov. 30, 1718, was killed at Fredericks-hall. Ulrica Eleonora, his second sister, succeeded him on the throne. She was assisted in the government by her husband, Frederick of Hesse-Cassel.

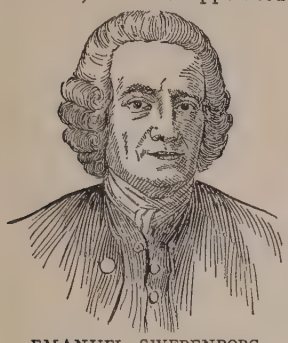
Both Eleonora and her husband, Frederick I., were mere puppets in the hands of the nobles, and Sweden was dominated by a powerful oligarchy. The two parties were known as the French, or *Hats,* and the Russians, or *Caps,* the former favoring French and the latter Russian predominance in Sweden. Frederick died in 1751 and was succeeded by Adolphus Frederick of Holstein-Gottorp, the latter giving favors to Russia. He died in 1771 and was succeeded by his son, Gustavus III., who overcame the two factions and recovered the former power of the crown. Factional disagreements were the cause of his assassination in 1792, and he was succeeded by his son as Gustavus IV. This sovereign lacked ability to cope with the difficulties of his time and he was finally deposed in 1809, being obliged to renounce the crown in favor of his uncle, Charles XIII. Charles was soon after required to cede a fourth of his territory to Russia. The dominant party elected Jean Baptiste Bernadotte as crown prince in 1810 with the erroneous idea of conciliating Napoleon.

Sweden joined the allies against Napoleon in 1814, but Denmark declared in favor of France, thus bringing on a war with the Danes. The peace of 1814 gave Sweden possession of Norway, but it lost Pomerania to Denmark, thus confining its sovereignty to the Scandinavian peninsula. Bernadotte succeeded to the crown in 1818 as Charles XIV. and reigned successfully until his death, in 1844, when he was succeeded by his son, Oscar I. His reign was peaceful and enabled Sweden to begin material industrial development, and on his death, in 1859, he was succeeded by his son, Charles Louis Eugene, as Charles XV. He died in 1872 and his brother, Oscar II., was crowned as his successor.

The long reign of Oscar II., a period of 36 years, was signally successful. It witnessed extension of the right of suffrage, the enlargement of the merchant marine, the building of canals and railroads, and the larger development of the industrial and mining enterprises. One of the problems of the dual kingdom under this sovereign was to satisfy the people of Norway, who finally declared their independence in 1905. The separation was brought about without bloodshed, largely through the self-restraint of King Oscar, who now governed under the regency of the Crown Prince Gustaf. On the death of his father, in 1907, the latter was crowned king as Gustaf V.

SWEDENBORG (swē'dẹn-bôrg), **Emanuel,** eminent author and scientist, born in Stockholm, Sweden, Jan. 29, 1688; died in London, March 29, 1772. He was a son of Jasper Svedberg, bishop of Skara, and studied at the University of Upsala, where he graduated with high honors. In 1710 he entered upon an extended

tour of Europe that covered four years, visiting in the meantime Holland, Germany, France, England, and other countries. On returning to Sweden, he was appointed by Charles XII. as assessor extraordinary to the Royal College of Mines. In that capacity he invented a vehicle to transport cannon to the siege of Frederickshall, wrote a treatise on the orbit and position of the earth and planets, prepared an extended outline on algebra, devised a monetary system, and published several lectures on the tides. Queen Ulrica, in 1719, recognized these services by ennobling the Svedberg family and changing the name to Swedenborg. He gave little heed to official formalities, but engaged his mind with mechanical and economical projects, and in 1724 declined a professorship of mathematics at Upsala.



EMANUEL SWEDENBORG.

In 1734 Swedenborg published at Leipsic a large work entitled "The Philosophy of Minerals," which attracted the attention of the most distinguished scholars of Europe. About the same time he published "First Principles of Natural Things," "The Final Cause of Creation," and the "Intercourse Between the Soul and the Body." From 1736 to 1740 he made a second tour of Germany, France, Holland, and Italy, and on returning published "Economy of the Soul-Kingdom." He resigned the post of assessor in 1747 to devote himself exclusively to the study and advocacy of spiritual things, and was given a pension equal to the half of his salary. Swedenborg claimed a revelation that made it necessary for him to interpret the word of God according to its true meaning, claiming that he had been in spiritual intercourse with a divine being and had been shown the world of spirits. While his eyes were thus opened to the scene of heaven and hell, he claimed to have conversed with acquaintances who had departed from this life as well as noted men of antiquity. He did not attempt to organize societies, but taught his doctrine in an unassuming but effectual way, gaining large numbers of adherents. However, since his death many societies based upon his teaching have been organized. Among the writings of Swedenborg not mentioned above are "New Jerusalem and Its Heavenly Doctrine," "The Apocalypse Explained," "Angelic Wisdom," "Heaven and Hell," "Conjugal Love," "Divine Love and Wisdom," and "Divine Providence."

SWEDENBORGIANS (swē-den-bôr'jĭ-ans), **or New Jerusalem Church,** the followers of Emanuel Swedenborg. The tenets of this society of religious worshipers embrace the belief that God is a trinity, not of persons, but of principles corresponding to the soul, the body, and the operative energy in man. Heaven and hell are believed to exist in this world as states of the soul, and it is assumed that these states are perpetuated in the spiritual world. Since the soul is thought to have a spiritual existence of its own, the material resurrection of the body is denied. Salvation implies faith, repentance, and obedience to the moral law. It is claimed that the last judgment occurred in the spiritual world in 1757, at which time Swedenborg received a revelation, and the new church then established marks the second dispensation of Christianity. The first Swedenborgian church organized in America was opened at Baltimore in 1792. At present there are 175 ministers, 212 societies, and 10,990 members in the United States. Among the educational institutions are the New Church School at Waltham, Mass., and Urbana University, Urbana, Ohio. The Swedenborgians have a considerable membership in France, Germany, England, and other European countries.

SWEET, Alexander Edwin, publisher and author, born in Saint John, New Brunswick, March 28, 1841; died May 22, 1901. In 1849 he accompanied his father to San Antonio, Tex., of which city the latter afterward was mayor. He attended the public schools, studied at Poughkeepsie, N. Y., and subsequently attended the Polytechnic Institute at Carlsruhe, Germany. In 1863 he returned to America to enter the cavalry of the Confederate army. Subsequent to the war he studied law and practiced that profession in San Antonio, and in 1879 became editor of the *Express,* published in that city. He was editor at different times of the San Antonio *Herald,* contributed to the Galveston *News,* and in 1881 founded the *Texas Siftings* at Austin, which he removed to New York after three years, where it was published until 1891. The writings of Sweet are characterized by remarkable humor and close discernment. "On a Mexican Mustang Through Texas from the Gulf to the Rio Grande," published with J. Amory Knox, is one of his best known works.

SWEETBRIER, or Eglantine, the name of several species of the rose, found native in many parts of Europe. It grows wild in pastures and neglected fields, and under favorable circumstances sends out numerous shoots or suckers. The leaves are fragrant and the flowers, which appear mostly on the lower branches, are fragrant and of a light rosy color. Sown in rows along walks, the foliage may be clipped into shape to form low and ornamental hedges. Several species have been naturalized in America.

SWEET FLAG, the name of a plant found in marshes of the Northern Hemisphere, described in medical works under the name *Acorus*

Calamus. The leaves are long and slender, the stem is aromatic, and at the upper part of the latter is a greenish spike of flowers. The medical properties, which are derived chiefly from the root, serve as a tonic and a stomachic. A preparation made from this plant is used in preparing a hair powder.

SWEET PEA, a flowering plant grown in gardens and parks. The seed is planted early in spring, usually in rich and well-cultivated ground, and is covered with two or three inches of loose soil. When the plants are about three inches high, a trellis is constructed along the rows as a support to prevent them from falling to the ground. The sweet pea blooms early in summer until the beginning of fall, provided the pods are not allowed to ripen. About 100 species have been cultivated for their flowers, which are variegated in colors and highly fragrant.

SWEET POTATO. See **Potato, Sweet.**

SWEET WILLIAM, the name of a species of pink, cultivated extensively as a flower in gardens. Several species grow wild and bear pale lilac-colored or bluish flowers in spring and early summer. See **Pink.**

SWETT (swĕt), **John,** educator and author, born in Pittsfield, N. H., July 31, 1830. He studied at the Pittsfield Academy and the Merrimac Normal Institute and began to teach in the district schools in 1847. In 1853 he was made principal of a grammar school in San Francisco, and ten years later became State superintendent of schools in California. While in this position he did much to enrich the course of study and reorganize the schools on a more systematic basis. In 1870 he was appointed deputy superintendent of schools in San Francisco, of which he became the city superintendent in 1876, and after thirteen years he retired from active educational work. His books include many texts that have been used extensively, and he was joint author with William Swinton of numerous texts on grammar, language, and geography. Among his works are "Methods of Teaching," "School Elocution," "American Public Schools," and "History of the Public School System of California."

SWEYN (swān), or **Svend,** King of Denmark and father of Canute the Great, born about 950; died in 1014. He invaded England about 1002, when he ravaged a large part of the country, and in 1013 made a second invasion. Ethelred, King of the Anglo-Saxons, was compelled to flee and his country was made tributary to Denmark. Although he proclaimed himself king, his power was not firmly established before his death and the government was left to his son, Canute.

SWIFT, a genus of birds of the swallow family, so called because of their rapid flight. They are widely distributed and include numerous species, most of which are migratory birds. Though the outward appearance is quite like that of the swallow, there is a marked difference in structure. Their flight is more rapid and steady, and they have a scream instead of a mere twitter, while a number of species are larger. They are seldom seen at rest, but remain almost constantly on the wing. The *American swift* is about five inches in length, but measures twelve inches in extent of wing. Its color is brownish-black and its nests are built largely near to or on buildings. The *common swift* of Europe is larger than the swallow, its wings measuring fully eighteen inches when expanded. It is a familiar bird around houses, where it builds a nest of twigs broken from trees, and in many instances utilizes small houses constructed for nesting. Several species of swifts build edible nests, especially those of Madagascar and the East Indies. The *esculent swift,* or *swallow,* is the bird most noted for building edible nests. In this species the female lays two eggs.

SWIFT, Jonathan, eminent satirist, born in Dublin, Ireland, Nov. 30, 1667; died Oct. 19, 1745. He was a son of an Englishman named Jonathan Swift, who served as steward of a court in Ireland, but the early death of his father caused his childhood years to be spent in poverty and dependence. After attending the Kilkenny School, he secured help from relatives to enter the Dublin Trinity College, where he remained seven years. Soon after he removed with his mother to England, where he was admitted to the home of Sir William Temple, an old acquaintance of the Swift family, and in 1694 became a clergyman with a charge in Ireland. This he resigned two years later to return to the home of Mr. Temple, who died in 1698 and left his writings to be edited by Swift. He returned to Ireland after completing that work and was made vicar of Laracor with a salary of $2,000 per year, and in 1713 was appointed dean of Saint Patrick's Church. The first writing from his pen was published in 1704 with the title of "The Tale of a Tub," and to it he afterward appended "The Battle of the Books." The former is a humorous satire in relation to three of the leading churches and brought him to ill repute among a large class of church adherents, and the latter had been written some time before in support of his patron, Sir William Temple.

Swift published a number of circulars and pamphlets in behalf of the English government in the period between 1705 and 1710, in which he gave the Whig principles loyal support, but in the latter year went over to the Tories, on whose side he continued to intrigue and publish satirical pamphlets. It was his ambition to hold an English bishopric, but his authorship of "The Tale of a Tub" proved fatal to him. Swift, failing to secure recognition under the English government, made an attack upon it in pamphlets, but withheld his name from the public. An

award of $1,500 was offered to secure the name of the author, but his friends in Ireland had no thought of betraying him, and instead raised him to the highest popularity ever accorded an English appointee among the Irish. In 1726 he made his last visit to England, when he published his "Gulliver's Travels," the most popular of his works.

It is supposed that Swift was secretly married to Esther Johnson, a lady with whom he became acquainted while residing with the Temple family and who is known in his writings as Stella. However, while on one of his visits to London he became acquainted with Hester Vanhomrigh, the daughter of a wealthy merchant, who was passionately fond of him. The incidents of Swift's life connected with these two ladies are of interest to literature, and the correspondence with the former was published as his "Journal to Stella." Other writings include "Public Spirit of the Whigs," "Reflections on the Barrier Treaty," "Conduct of the Allies," "Proposal for the Universal Use of Irish Manufactures," "Project for the Advancement of Religion," "Drapier's Letters," and "Predictions for the Year 1708."

SWIMMING, the act of moving in water by natural means of propulsion, as by the movements of limbs, fins, or other organs of the body. As an art, swimming is exceedingly useful, both as an exercise for the body and as a protection to life, and for these reasons it is quite important that all young persons acquire skill in moving safely in the water. The human body, when the lungs are inflated, is slightly lighter than an equal volume of fresh water, thus making it quite easy to float on the surface. Salt water being heavier than fresh, it is still less difficult to swim in salt-water lakes and the sea than in fresh water. When in the water there is a natural tendency for the head to sink while the body is in a floating condition, hence it is of much importance to keep the head above water and the lungs inflated with air as much as possible. In order to keep the head above water, the swimmer must endeavor to keep the body up to the shoulders below the surface.

When learning to swim, it is best to frequent a quite sandy beach of limited depth, thus avoiding the danger of getting into water too deep for safety. Greater security is insured by attaching corks, inflated bladders, or air belts near the shoulders. Movement forward in swimming is produced by the arms and legs being extended and adducted consecutively. Various skillful arm movements should be practiced, such as over-hand, half-circle, and side movements. Skillful swimmers employ these either singly or in different combinations. Most swimmers aim to move forward on the breast, especially in making long distances, but well-trained swimmers are able to make considerable speed by swimming on the side or back. Beginners are usually prevented from readily learning the art of swimming for want of confidence, and later often develop overconfidence to such an extent that fatal results are not infrequent.

A swimmers' union was organized in the United States in 1888, whose purpose is to develop swimming into a more popular and highly accomplished art and to give annual swimming contests. Among the best records made by contestants are the following: 440 yards in 5.51 minutes; 880 yards in 12.45 minutes; 220 yards in 2.38 minutes; 300 yards in 3.46 minutes, and 150 yards in 1.38 minutes. The Olympic games of 1924, in France, brought several of the best swimmers of the world into competition. Various conditions are essential in order to secure the best results in the matter of speed. It is possible to swim with greater rapidity with the current than against it, or even with the wind, and the depth of the water influences materially. One of the remarkable instances of swimming is that of Gertrude Ederle, who, in 1926, swam from Calais, France, to Dover, England, making the distance across the English Channel in 14.5 hours, but she was driven by the tide in a zigzag course, so the distance actually swam was about 37 miles, nearly twice the distance across.

Many animals have a greater or less capacity for swimming, either in or on the surface of the water. Fishes are the best swimmers. They effect a rapid forward movement by means of their fins and tail, but some species propel themselves by undulations of different parts of the body. Some crustaceans swim by flapping their shells, and others by ejecting water from the body. Quadrupeds swim easily, the head being so placed as to remain naturally above the surface.

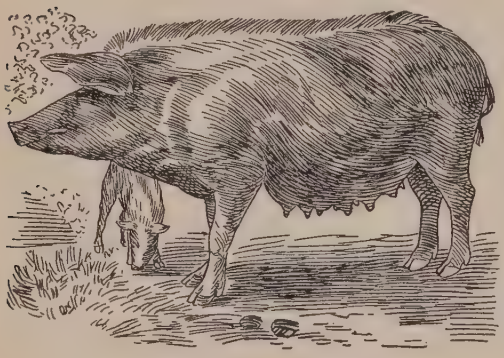
SWINBURNE (swĭn'bûrn), **Algernon Charles,** poet and essayist, born in London, England, April 5, 1837; died April 10, 1909. He descended from a noble family, being a grandson of Earl Ashburnham, and his father was Admiral Charles H. Swinburne. After studying at Eton, he entered Oxford University, but left without taking a degree in order to accompany W. S. Landor to Italy. His first writings were published in 1861 under the titles of "The Queen Mother" and "Rosamond," but the first production to attract wide attention was his "Poems and Ballads," published in 1866. Subsequently his writings were very numerous and extensively read, some of them going through many translations and editions. His style is masterful and interesting and his command of language is extraordinary. Among the poetical productions are "Song of the Spring Tides," "Ode on the Proclamation of the French Republic," "Song of Italy," "Songs Before Sunrise," "Select Poems," "Astrophel," and "A Century of Roundel Poems." His works in prose include "Life of Victor Hugo," "Study of Shakespeare," "Criticism of Rosetti," "Study of Ben Jonson," "Essays and Studies," and "Studies in Prose and Poetry."

SWINE, or Hog, a genus of hoofed mammals. They include species that are highly important for food and other products. The neck is very thick and strong, the head is prolonged, the eyes are small, and the nose is slightly truncated. Stiff bristles cover the thick skin of most species. Underneath the bristles are short, curled hairs. The feet have four toes, all separately hoofed, but only the two front toes reach the ground. In a wild state the male has enlarged bristles on the back of the neck that form a kind of mane, but this disappears in the highly domesticated species. The tail is short and fleshy. Their food consists of almost every kind of vegetable and animal substances, but in a wild state they cannot be reckoned with the beasts of prey, though poorly fed swine often attack chickens and other small domestic animals. Two or more litters of young are brought forth each year, usually ranging from five to fifteen in number, thus making them the most prolific of domestic animals.

The domestic hog is a descendant of the wild boar, which is still found in some parts of Europe and Asia, but the breeds have been improved remarkably by careful husbandry, making them larger in size, finer in quality, and more docile in spirit. Hogs are clean but savage in the wild state, and in the domestic state partake largely of their surroundings, being highly clean and quite intelligent under careful treatment. No animal is more important in the productive industries, though its flesh is considered unwholesome in some of the warmer countries. The flesh of swine was not admissible as a food under the Mosaic law, and it is still prohibited by the Jews and Mohammedans. *Lard* is the fat of the hog rendered under high temperature, and is considered the most valuable of the fats for many purposes. The skin is tanned for use in bookbinding and saddlery, the bristles are used for brush making, and the hoofs yield mucilage. *Pork* is the name generally applied to the flesh, which is eaten in a fresh or salted state, and is converted to a large extent into bacon, sausage, and hams. Vast quantities of cured pork are consumed in the military and naval service, largely because it takes salt more readily than any other flesh.

The culture of swine is a highly important industry along with farming. Corn is the favorite food, which is fed either ground or from the ear, but barley, rye, wheat, and other cereals are fed to a considerable extent, though chiefly in a ground condition. The gluttonous disposition of the hog makes it possible to rear herds in rapid succession. They can be placed on the market with profit when only six to twelve months old. The young litter brought forth in the spring is counted the most valuable, as the small pigs can then accompany the sow to pasture, the young vegetable growth being highly valuable in addition to milk and cereal food.

Many breeds of hogs are reared in Canada and the United States. Those reared the most extensively include the Poland-China, Chester White, Berkshire, Jersey, Yorkshire, Neapolitan, and Essex. The Poland-China, which is a representative breed, is either black or black with whitish spots, while other breeds are reddish or pure white. Iowa is the greatest hog-producing State in the Union. Others taking high rank are Illinois, Missouri, Ohio, Indiana, Kansas, Nebraska, and Kentucky. The total number of hogs produced annually in the United States aggregates 175,500,000 head, representing a value of $2,150,500,000. Ontario is the leading hog-producing Province of Canada. Hogs are shipped alive to the market, where they are sold to packing houses and butchered, and the meat is prepared to be suitable for consumption. Among the leading packing-house centers of North America are Chicago, Kansas City, South Omaha, Sioux City, Cincinnati, Toronto, and Montreal. American pork is transported to practically all countries of the world, especially to Germany, France, and England, where the production is not sufficient to supply the demand. See **Meat Packing.**



UNIMPROVED HOG.

CHESTER WHITE FEMALE.

SWING, David, clergyman, born in Cincinnati, Ohio, Aug. 23, 1830; died Oct. 3, 1894. He spent his early life on a farm. In 1852 he

graduated from Miami University, Oxford, Ohio, and soon after began the study of theology. However, he was made professor of languages in Miami College, where he lectured twelve years, preaching occasionally in the meantime. He became pastor of the Fourth Presbyterian Church in Chicago in 1866, where he ministered until 1874, when it was charged that his doctrines were heterodox and he was placed on trial before the presbytery. The investigation extended several weeks and he was acquitted, but withdrew from the presbytery and held independent services. His eloquence and able discussions attracted large congregations. Among his chief writings are "Truths for To-day," "Old Pictures of Life," and "Sermons."

SWINTON (swĭn'tŭn), **William,** author, born in Haddingtonshire, Scotland, April 23, 1833; died in New York City, Oct. 24, 1892. He accompanied his mother to Montreal, Quebec, while a youth, and studied in Amherst College, Massachusetts. In 1853 he began to teach, holding professorships in Mount Washington Institute, New York, and several other institutions. In the meantime he contributed to *Putnam's Magazine.* At the beginning of the Civil War he became field correspondent of the New York *Times.* Subsequently he devoted himself to literary work. His chief publications include "Twelve Decisive Battles of the War," "Campaigns of the Army of the Potomac," "Masterpieces of English Literature," and "Review of McClellan." Swinton is best known by his school text-books, which include those on reading, literature, word analysis, and spelling.

SWISS GUARD, the famous regiment maintained in France and composed exclusively of Swiss. It was first organized by a royal decree in 1616. During the Revolution of 1789 the members of this regiment remained loyal to the government, but on Aug. 10, 1792, while defending the Tuileries against a mob, they were overwhelmed and many were massacred. About 800 of their number fell that day, and their memory is commemorated in Thorwaldsen's "Lion of Lucerne," cut in a cliff at Lucerne, Switzerland. In 1815 an effort was made by Louis XVIII. to revive the Swiss Guard, but the body was disorganized in the Revolution of 1830.

SWITZERLAND (swĭt'zẽr-lạnd), in German, *Schweiz,* a republic of Central Europe, located between 45° 50′ and 47° 50′ north latitude and 5° 48′ and 10° 28′ east longitude. It is bounded on the north by Germany, east by Austria-Hungary, south by Italy and France, and west by France. The length from east to west is 208 miles and the width is 128 miles. The Jura Mountains form the natural boundary between Switzerland and France, and the southern boundary is mainly by the crest of the Alps, but the other borders do not conform to natural features. The total area is 15,976 square miles.

DESCRIPTION. The surface is diversified by lofty ranges, beautiful lakes, extensive glaciers, and fertile valleys. Both the Alps and the Jura Mountains traverse various sections, the former largely in the south and the latter along the western boundary. The Alps separate the country from Italy, where they reach their highest altitudes in Mont Blanc, Mont Rosa, and Mont Jungfrau, which lie at or near the border. The general elevation of the Alps in Switzerland ranges from 6,000 to 9,000 feet, reaching their culminating peak in Mont Rosa, height 15,217 feet. Peaks of considerable altitude occur in the Jura Mountains, this chain being linked to the Alps by a range called the Jorat, but they do not exceed 5,505 feet, which is the elevation of Mont Dôle, the highest of this range in Switzerland. The snow line is about 9,250 feet above sea level, hence Switzerland has a large area of perpetual snow. These collectively exercise a prolific modifying influence upon the climate. Much of the central part of the country is a plain, with an elevation of 1,300 feet above the sea.

The rivers are not large, but they are important as sources of water power. They are well supplied with water the entire year, since the melting snow of the Alps feeds them during the period when rainfall is not abundant. Many of the important rivers of Europe have their source in Switzerland, including the Po, the Rhine, and the Rhone. However, the Rhine and its tributaries furnish the greater part of the drainage, but the swiftness of the streams makes them almost useless for navigation. The Aar, a tributary of the Rhine, is navigable by vessels of considerable size and carries a larger volume of water to their junction than the Rhine itself. Lake Geneva is entered by the Rhone, which carries the overflow across the border into France. The Ticino, a head stream of the Po, crosses the border into Italy. Considerable drainage is carried by the Inn to the Danube, which it enters at Passau, where it discharges a larger volume of water than the Danube itself. Lake Constance, in the northeastern part, is partly in Germany. The largest body of water within the country is Lake Geneva, on the southwestern border. Other lakes include Zürich, Thun, Lucerne, Neuchâtel, Brienz, Bienne, and Maggiore. The interior lakes belong to the Rhine basin, while Lake Geneva is drained by the Rhone, and Lake Maggiore, partly in Italy, has its outlet through the Po.

The climate is necessarily varied according to altitude and proximity to the snow-capped mountains, but all sections are healthful and agreeable. A temperate climate prevails on the central plain and in the valleys, where the mean annual temperature is about 50°. With every thousand feet of ascent the temperature diminishes three degrees, hence the elevated valleys have a severely cold atmosphere in winter. Clouds hover over the higher Alps most of the time, and here the rainfall ranges from 70 to 90 inches. In the central plain the rainfall is 30 inches. A warm wind from the south, called

the *Föhn*, frequently causes a rapid melting of the snow and consequently inundations and avalanches.

Mining. The mining industry does not produce sufficient to supply the demand of the more important minerals. Anthracite coal is mined near Bern, in Fribourg, but large quantities are imported from Germany and Austria. Salt rock is found in several of the cantons and the yield is sufficient to permit exportation. Val des Travers has valuable deposits of asphalt, slate is found in Glarus, and marble quarries are worked in Ticino and Schwyz. The Jura Mountains contain deposits of iron ore, though the output of this mineral is not sufficient to supply the demand. Granite, marble, and limestone are found in large quantities suitable for building purposes, and clays for brick and pottery are abundant. Other minerals include slate, manganese, and rock crystals of great beauty. Mineral waters are abundant in the mountain springs.

Agriculture. Two-thirds of the inhabitants engage in farming. Fully 72 per cent. of the area is productive, and the lands are owned largely by peasant proprietors. Thirty-six per cent. of the surface is hay and pasture land, which is considered the most valuable, and farming is conducted with the greatest of care and most watchful attention. Wheat yields profitably up to elevations that range 2,500 feet above sea level, but the amount grown is not sufficient to supply the demand. Rye, oats, potatoes, and barley are the chief crops, and large interests are vested in the cultivation of vegetables and fruits. The grape industry is well developed in all the cantons, but the best wine is obtained from Geneva and Neuchâtel. Almonds, chestnuts, olives, and lemons are grown in the warmer cantons of the south, where the hillsides are dotted with fine orchards. Gardening and flower-growing receive marked attention. Considerable progress has been made in the industry of cultivating the mulberry tree and silkworms. Cattle raising is carried on generally in the country, owing to the extensive grazing lands that are too hilly for cultivation. Dairying is highly developed and Swiss cheese is exported to all parts of the world. Other domestic animals include horses, sheep, goats, swine, and poultry. Switzerland is visited annually by a great influx of tourists, making it necessary to import large quantities of meat. However, the lakes and rivers abound in fish, and pisciculture is promoted by a large number of establishments. Lands that are used for grazing are partly timbered, but fine forests too dense to produce grasses are found in some sections. The forest trees include the beech, walnut, maple, oak, and pine.

Manufactures. Switzerland has extensive interests in manufacturing, although it has no seaports and does not produce sufficient coal and iron. The government has given encouragement through the maintenance of industrial and technical schools for the dissemination of knowledge in mining, dairying, agriculture, and architecture. Ample water power is furnished by the streams. The manufacturing centers are near the markets of adjoining countries where raw materials can be obtained and the finished products may be sold. The people are skillful and persevering, and it is characteristic of them to utilize their resources to the best possible advantage. Textiles and metal products are of first importance, and in the quality of lace and embroidery the country is unexcelled. Basel is the center of the silk industry, especially in the manufacture of silk ribbons, and large quantities of dress goods are woven at Zürich. The manufacture of clocks and watches is the leading metal industry and the chief centers of this enterprise are at Locle and Geneva. Other manufactures include musical instruments, pottery, tobacco products, sugar, jewelry, leather, and machinery. Canned milk and fruits, wine, and cheese hold a high place in the list of manufactures.

Commerce and Transportation. Switzerland occupies a singular position commercially, since it has a large foreign trade in spite of the fact that it produces insufficient quantities of nearly all of the raw material to supply the demand. It exports large quantities of cotton and silk textiles, lace and embroidery, wine, cheese, jewelry, and watches. The imports consist principally of coal, raw cotton, grain, iron, and petroleum. Trade is principally with Germany, France, Italy, Great Britain, Austria-Hungary, and the United States. While the American imports are not extensive, large quantities of manufactured products are exported to American ports.

The country has excellent highways and extensive canal facilities, besides railroads aggregating 3,525 miles. About half of the railways are owned and operated by the government. The telegraph lines aggregate a total of 15,500 miles under government control and 10,500 miles under private ownership. Connection by railway is made with Italy through the Saint Gotthard tunnel. The lakes are important for navigation. A harbor of considerable extent is maintained at Basel, whence shipments are made via the Rhine to Strassburg and other points in Germany. The highways are in an excellent condition in all parts of the country.

Government. The government of Switzerland is a constitutional republic, the chief executive functions being vested in a national council of seven members chosen by the assembly. The president of the confederation is the highest executive officer and is elected by the federal assembly. The legislative authority is vested in the federal assembly, which consists of two divisions, the state council and the national assembly. Nineteen cantons and six half-cantons constitute the confederation. The government is administered under a constitution dating from 1874. The state council is constituted of 44

members, two from each canton, and the national assembly is formed of members chosen by direct vote of the adult population at the rate of one representative for every 20,000 inhabitants. Federal elections are held every three years, but the president and vice president are chosen by the federal assembly for a term of one year, and may not be reëlected until after having been out of the office at least one year. The national judiciary, called the federal tribunal, consists of nine members elected by the federal assembly for six years and has appellate jurisdiction of both civil and criminal cases. Switzerland has no standing army in the usual sense of the term, but the army is made up of all citizens of military age. The organized military force is classed into the three divisions called the *Auszug,* the *Landwehr,* and the *Landsturm.* The first includes all men between 20 and 22; the second, those from 32 to 44; and the third, those of 17 to 50 years not included for any reason in the other two divisions. Children of eight years and over are given military instruction, which is promoted and encouraged by means of annual exercises and reviews. The war footing is given at 528,250 men.

Education. A free system of public schools is maintained, to which attendance is free and obligatory. The requirement to attend school is rigidly enforced in the Protestant cantons, but it is neglected in a number of the others. Illiteracy has been reduced to 1 per cent. Besides the common schools, there are ample provisions for higher education. The celebrated institutions of higher education include the universities of Bern, Geneva, Zürich, Basel, and Fribourg, to which students are attracted from all parts of Europe. Academies with extensive courses are maintained at Geneva and Lausanne. Zürich has a federal polytechnic school. Freedom of worship is extended to all the sects, but the Jesuits are not permitted to maintain organizations. A large majority of the people belong to the Evangelical Reformed Church, a branch of the Lutheran Church. About one-fifth of the inhabitants are Roman Catholics.

Inhabitants. The inhabitants of Switzerland were known as the Helvetians to the Romans. These people were of Celtic origin and were later influenced by the Rhaetians and the Teutons, the latter taking precedence. German is the prevailing language and is spoken by 2,350,000 of the inhabitants, while the remainder use the French, Italian, and Romansch languages, the last mentioned being a form of the Latin, frequently called *Rhaetian.* According to the latest estimates, there are 725,500 French, 220,500 Italian, and 38,500 Romansch in the country. Bern, on the Aar, is the capital. Other cities include Zürich, Basel, Geneva, Lausanne, Saint Gallen, Chaux-de-Fonds, and Lucerne. Population, 1920, 3,953,293.

Literature. No country takes higher rank from the standpoint of literacy and refinement, and among the great writers and statesmen of Switzerland are names that add luster to its nationality. The literature belongs almost exclusively with that of the Germans, but includes the products of a number of eminent writers classed with the French and Americans. Among the most eminent literary men may be named Pestalozzi, Breitinger, Sulzer, Johann von Müller, Bodmer, Haller, J. J. Rousseau, Hottinger, Hirzel, Gesner, Bonnet, and Agassiz.

History. The region now included in Switzerland was populated at the beginning of the historical period of Western Europe by the Helvetians in the north and the Rhaetians in the south, and both became subject to the Romans about 58 B. C., under whom they remained until about 215 A. D. Incursions were made by the Alemanni, who joined Switzerland to the German Confederation, and later settlements were formed by the Burgundians and Goths. Subsequently the Franks under Clovis made a number of settlements, and the whole region came under Frankish control in 534. Christianity was introduced among the Burgundians in the 5th century, but the Helvetians retained their pagan worship until the 7th century. It formed a part of the Frankish empire under Charlemagne, but his successors annexed a part to France and a portion to Germany, and in the early part of the Middle Ages the entire region was united to the German Empire. Feudalism was introduced soon after and the counts were only in part dependent upon the German emperors. However, a series of civil wars were instrumental in securing the freedom of several cantons and special charters for many of the towns. The counts of Hapsburg secured possession of Unterwalden, Uri, and Schwyz, three of the forest cantons, in the early part of the 13th century, and assumed the right to govern as sovereign rulers. The claim to sovereignty was denied by the cantons and the citizens organized to expel the Austrian counts. This, according to tradition, was effected by solemn compact made on Nov. 7, 1307.

We learn from traditional accounts that 31 representatives met at night in a solitary spot near Lake Lucerne, where the compact was subscribed to and those interested were bound by oath to its observance. The leaders chosen were Stauffacher of Schwyz, Arnold of Unterwalden, and Furst of Uri, with his son-in-law, William Tell. These leaders aroused the peasants to the duty of maintaining their freedom and independence and on Jan. 1, 1308, successfully deposed and expelled the Austrians. An invasion under the Austrian counts soon followed, but the Swiss defeated them with great loss at Morgarten in 1315, thus securing the independence of the three cantons. They annexed the city of Lucerne in 1332, Zürich in 1351, the cantons of Glarus and Zug in 1352, and Bern in 1353. However, Austria claimed jurisdiction of the cantons of Glarus and Zug and the city of Lucerne, and accordingly invaded Switzerland,

but the Austrian army was defeated by the Swiss under Arnold of Winkelried at the Battle of Sempach in 1386.

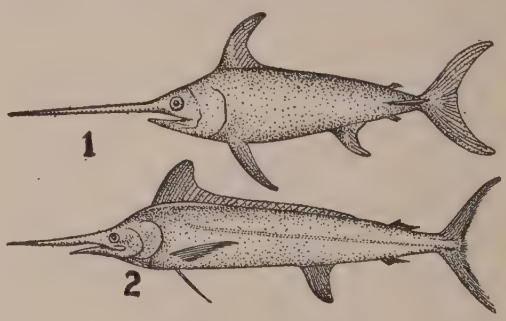
The Swiss became aggressive in 1415 and invaded Aargau and Thurgau, territory belonging to Austria, and in the war resulting from this move they were again successful. They secured the cession of these regions by a treaty in 1460. Freiburg and Solothurn were admitted into the confederation in 1481, as the result of a successful war against Charles of Burgundy. Emperor Maximilian I. of Austria made a final attempt to bring the Swiss into subjection by invading their territory in 1498, but met with defeat in six desperate battles, and the Peace of Basel of 1499 gave Switzerland practical independence, though international sanction was not secured until 1648. The three cantons of Basel, Schaffhausen, and Appenzell were long sympathetic and active allies to the confederation, and the two former were annexed in 1501 and the latter in 1513, thus bringing the number of cantons up to thirteen.

Zwingli began to preach the Reformation at Zürich in 1518, and his religious tenets were adopted by that canton in 1523, while Bern and the other cantons in the north soon followed, though the forest cantons remained attached to Catholicism. In 1531 war broke out between the two factions and Zwingli was slain at the Battle of Kappel. The work of the Reformation was soon taken up by Calvin at Geneva, but severe struggles and internal dissensions prevailed for several centuries. The aristocracy gained considerable influence in the larger cantons, but the Protestants secured a final victory, in 1712, at the Battle of Wilmergen. Public thought began to turn toward internal development soon after, resulting in the construction of canals, the building of cities and schools, and the development of a national spirit, law, and literature. The French seized Switzerland in 1798, when a number of cantons were added, but the peace of 1815 again restored independence and brought the number of cantons up to 22. This treaty was made at Vienna and declared the perpetual neutrality of Switzerland and parts of North Savoy under the guarantee of the great powers, who pledged themselves to maintain Swiss independence. The order of Jesuits was expelled in 1847, and the following year a number of disturbances occurred as a result of the Revolution of 1848 in France. This resulted in the adoption of the constitution of 1848, which forbade many monastical practices in Neuchâtel and other cantons.

The present constitution of Switzerland is a revision made in 1874 and was formally adopted on April 19 of that year. It accords greater power to the federal authorities, guarantees a larger scope of political rights to the citizens, and extends the suffrage. The 600th anniversary of the Swiss republic was celebrated in 1891, thus giving it the proud distinction of being the oldest of existing governments based directly upon democracy and the common rights of all. Switzerland has made material progress in its commercial and industrial life since the latter part of the 18th century, and the government is continually exercising its offices to extend its commercial and material importance. Although the history of the country has been comparatively uneventful the past century, it has been marked by a steady intellectual and national growth. In 1908 the federal council prohibited the manufacture and sale of absinthe. Reforms in labor laws and insurance for the working classes were adopted about the same time.

SWORD, a weapon of offense or defense, used either as a dagger or like a large knife. It is made of a long steel blade fitted with a handle large enough to grasp with one hand, and, in some cases, with both hands. The blade is larger than that of the dagger or poniard, but it is not mounted on a long handle or staff. In the English language the name sword is applied to both the straight and the curved weapon, but in German the former is known as *Degen* and the latter *Säbel,* while the general name is *Schwert.* The length of the blade varies from 30 to 35 inches, which is about the length of a *saber,* a weapon used extensively in the cavalry of the United States for cutting and thrusting. However, some military organizations carry a saber with a curved blade intended only for cutting. Formerly the sword was used extensively, but it went rapidly out of use after the invention of modern weapons of war. Swords made of bronze and later of iron were used in ancient Greece. Tempered steel was used in making the straight swords employed in Rome at the beginning of the Christian era.

SWORDFISH, a family of spiny-rayed fishes, allied to the mackerels. They attain a length of fifteen feet and have the bones of the upper jaw consolidated to form a long, sword-like process. Swordfish are widely distributed in the open seas of tropical and subtropical climes; and, being quite strong and swift, the larger species are rarely captured. The ventral fins are absent and the dorsal fin is high, without distinct spines. Only a few species are known. Most of those caught have a bluish-black color above and silvery-white beneath. They pursue schools of mackerel and other



1, Swordfish; 2, Spearfish.

fishes, and feeds on them with great greed. The swordlike projection forms about three-tenths of their length and is used as a weapon with which to attack other fishes. They have been known to pierce the timbers of ships with these projections and to kill large-sized whales. Young swordfish are considered good food, both fresh and salted, but when older the flesh becomes less palatable. These fishes are abundant off the Atlantic shore of North America and in the Mediterranean, and in the latter are harpooned by fishermen of Sicily and Naples. Those native to the Mediterranean are generally spoken of as the *common swordfishes*. They attain a length of ten to twenty feet.

SYBARIS (sĭb'ăr-ĭs), a city of the ancient Greeks in Lucania, in the southern part of Italy. It was situated on the west shore of the Gulf of Tarantum, between the Crati and the Coscile rivers, a short distance from the sea. The Achaeans founded it about 720 B. C., but other nationalities were permitted to take part in its government. According to Strabo, the city reached its height of prosperity about the year 500 B. C., when it ruled over 25 subject cities and sent an army of 300,000 men into the field. It carried a large trade with centers in Europe and Asia Minor, but finally fell into the hands of Telys, a tyrant supported by the popular party. The Crotonians destroyed the city while it was in the height of its prosperity and turned the bed of the Crathis (now Crati) over the site. In 1879 extensive excavations were made to determine the exact location of several large buildings, but little of value was brought to light.

SYCAMORE (sĭk'ă-mōr), the name applied to a species of maple trees. It occurs in abundance in the west central part of North America, especially in Ohio and Indiana, where it is frequently called the *plane tree*, or *buttonwood*. The leaves are broad and the bark is white. *Sycamore* is properly the name of a large tree native to Syria and Egypt, which is allied to the common fig. This tree yields a small fruit which is used extensively in Egypt for food, and the wood, though light and soft, is very durable, having been used for the coffins of mummies. The fruit is top-shaped, well flavored, and somewhat aromatic. Trees of this species are widespreading, the top often occupying a space forty yards in diameter. They are planted near villages and along highways for shade and ornamental purposes.

SYCAMORE MAPLE.
Flower and Seed.

SYDNEY (sĭd'nĭ), a seaport city of Australia, capital of New South Wales, the oldest city in that continent. It occupies a convenient site on Jackson Bay, an inlet from the Pacific Ocean, on which it has a large and well-improved harbor. An extensive system of railroads furnishes communication with the regions lying inland, thus giving the city important domestic and foreign trade advantages. The streets are regularly platted, intersecting each other at right angles. It has stone and macadam pavements, waterworks, sewerage, and adequate means for rapid transit. Among the notable buildings are the post office, the government house, the parliament building, the customhouse, the Cathedral of Saint Andrew (Anglican), the Cathedral of Saint Mary (Roman Catholic), the National Art School, and the public library. It is the seat of the University of Sydney, several hospitals, and a number of industrial institutes. Hyde Park is one of several fine public grounds.

Sydney is important as an industrial center. It has large flouring mills, lumber yards, grain elevators, and railway shops. The manufactures include machinery, glue, leather, cured meat, vehicles, boots and shoes, sugar, paper, furniture, hardware, glass, pottery, steam engines, and clothing. It has a large export trade in coal, preserved meat, wool, wheat, copper, hides, tallow, and tin. The imports include coffee, tea, cotton, wearing apparel, and colonial goods. The place was founded in 1788. It was named in honor of Viscount Sydney, then colonial secretary. Its prosperity dates from 1851, when gold was discovered in the region lying inland, but it has been largely augmented by railroad building and the establishment of manufactures. Population, 1901, 487,903; in 1921, 899,099.

SYDNEY, a city of Nova Scotia, county seat of Cape Breton County, 200 miles northeast of Halifax. It is situated on Cape Breton Island and the Intercolonial Railway, and in the vicinity are extensive coal mines. The harbor is safe and commodious. It is the terminus of lines of steamers with Halifax and other cities. The industries include meat packing, machine shops, shipbuilding, and steel and iron works. Among the noteworthy buildings are the public library, the county courthouse, the high school, the Sydney and the Grand hotels, and a number of fine churches. Electric lighting, waterworks, and sewerage are among the public utilities. Population, 1922, 24,980.

SYLLOGISM (sĭl'lŏ-jiz'm), in logic, the principal method of deductive inference, that is, an inference from the general to the particular. It contains three terms, the *subject* and the *predicate* of the conclusion, and a term called the *middle term,* which occurs in both premises. The syllogism has three propositions, namely, two premises and a conclusion. The premise containing the major term is called the major premise; the major term is the predicate of the conclusion. On the other hand, the premise containing the minor term is called the minor premise; the minor term is the subject of the conclusion. The following arrangement is in the regular form of deductive reasoning:

All men are mortal.
John is a man.
Hence, John is mortal.

It will be seen that the first two propositions, called the premises of the reasoning, or syllogism, make the proof of the third, while the third proposition, called the *conclusion,* is the point to be proved. The arrangement may be expressed in the formula: "M is P, S is M, therefore S is P." Premises may be negative as well as affirmative, that is, S is not P, as well as S is P, and they may include either all or a part of the subject, as some S is P, or some S is not P. From these we have the four cardinal propositions:

Universal affirmative: All S is P.
Universal negative: No S is P.
Particular affirmative: Some S is P.
Particular negative: Some S is not P.

The four cardinal propositions, as a matter of convenience, are designated by the four first vowels: namely, A, universal affirmative; E, universal negative; I, particular affirmative; O, particular negative. In combining these four propositions in all the possible ways of three in a set, we obtain 64 sets, which are called *moods.* However, only eleven of these moods give valid conclusions, namely, AAA, AAI, AEE, AEO, AII, AOO, EAE, EAO, EIO, IAI, and OAO. Every mood of the syllogism has four figures. In the first figure, the middle term is the subject of the major premise and the predicate of the minor; in the second, the middle term is the predicate of both premises; in the third, it is the subject of both premises; and in the fourth, it is the predicate of the major premise and the subject of the minor. Since each of the eleven moods has four figures, it follows that there are 44 syllogisms, but of these only nineteen are found by examination to be distinct and valid.

When one of the premises is understood but is not expressed in the statement, the syllogism is called an *enthymeme.* When several premises are employed for the same conclusion, several syllogisms are in fact abridged into one formula, which is called a *societas.* When one premise is assumed as hypothetically true and the conclusion is stated as depending upon the truth of the other alone, we have what is called a *conditional judgment.* On the other hand, if the conclusion is stated as depending upon the falsity of the other, we have a *disjunctive judgment.* Besides the fulfillment of all the conditions of the formulas in syllogisms, it is necessary to observe certain conditions and laws in regard to the use of words, this being necessary to the validity of the reasoning. A violation of these laws gives rise to fallacies.

SYLVESTER, the name of two popes and an antipope. Sylvester I. was elected Pope in 314 and governed the church during the reign of Constantine I. He sent two legates to represent him at the Council at Nicaea and exercised much influence over the emperor. He died in 335, having served about 21 years. Sylvester II. became Pope in 999, at the advanced age of 64 years, and died in 1003. His name is associated with progress in scientific studies, especially in astronomy, mechanics, and mathematics. The superstition of the times caused people to look upon him as a magician, and there was a popular belief that his soul had been sold to Satan. Sylvester III. was the antipope of Gregory VI., but was deposed in 1046 by the Synod of Sutri. See **Pope.**

SYMBOL (sĭm'bŏl), a sign or representation of an idea, used to suggest a quality, operation, or name. Symbols are used in mathematics to represent a quantity or an operation, or to express relationship between two or more quantities. In chemistry, symbols are abbreviations standing for the name of an element, and consist of the initial letter of the Latin name, or sometimes of the initial letter of the name of an element. Astronomical symbols are used to indicate the signs of the zodiac and the phases of the moon. For instance, ☽ indicates new moon; ☽, the first quarter; ☽, full moon; and ☾, the last quarter. See **Arithmetical Signs; Chemistry; Zodiac.**

SYMMES (sĭmz), **John Cleves,** eminent pioneer, born on Long Island, New York, July 21, 1742; died in Cincinnati, Ohio, Feb. 26, 1814. In 1787 he formed an association to colonize a large tract of land along the Ohio and Miami rivers, for which purpose he obtained a grant of 1,000,000 acres of land. The first settlement was made by a company from New Jersey, which settled the town of Losantiville, but the name was later changed to Cincinnati by Governor Saint Clair. Symmes failing to colonize all the land granted, the tract was reduced to 238,540 acres. The *Symmes purchase,* as the tract was called, was instrumental in causing the passage of the first preëmption law in 1801.

SYMMES, John Cleves, soldier and lecturer, nephew of the former, born in New Jersey in 1780; died May 28, 1829. After serving with success in the War of 1812, he settled at Newport, Ky., where he devoted himself to lecturing and literary work. He announced the remarkable theory that an enormous opening, called *Symmes' Hole,* exists at 82° north lati-

tude and that it communicates with the earth's interior. Several writings published by him maintain that the interior of the earth forms a large hollow space, which may be inhabited, and that this region may be reached by descending the Symmes' Hole. His chief work is entitled "Theory of Concentric Spheres."

SYMONDS (sĭm'ŭndz), **John Addington,** historian, born in Bristol, England, Oct. 5, 1840; died in Rome, Italy, April 19, 1893. He graduated from Oxford University and in 1862 was made fellow of Magdalen College. His first writing to attract attention is an "Introduction to the Study of Dante," in 1872, and four years later he published "Studies of the Greek Poets." The most noted of his publications is "Renaissance in Italy," a work of seven volumes, on which he labored a period of eleven years. This work appeared in five parts, bearing the titles, "Revival of Learning," "Age of Despots," "Fine Arts," "Italian Literature," and "Catholic Reaction," the last two mentioned containing each two volumes. The last twenty years of his life were spent at Davos Platz, a health resort in Switzerland, where he wrote his later works. These include "Life of Shelley," "Our Life in the Swiss Highlands," "Wine, Woman, and Song," "Autobiography of Benvenuto Cellini," and "Shakespeare's Predecessors in the English Drama."

SYNAGOGUE (sĭn'ă-gŏg), a place of meeting for Jewish worship and religious instruction, which corresponds to a church used by Christians for a like purpose. Jewish worship of the highest type was limited by the Mosaic law to the divinely chosen Jerusalem, but gatherings were held in various localities, even in the early period of the monarchy. When the Israelites were exiled in captivity to Babylonia, they constructed synagogues in different places, but always so they had their faces turned toward Jerusalem when entering at the door and when praying. Buildings of a similar character were constructed after the return from captivity and soon dotted all the inhabited parts of Palestine. Many synagogues were maintained in the time of Christ. It is mentioned specially in the Bible that Jesus taught, preached, and wrought miracles in the synagogue of Capernaum. The apostles found synagogues in various places not located in Palestine, including those in the cities of Damascus, Iconium, Thessalonica, Athens, Corinth, and Ephesus.

The synagogues were formerly built with a partition five to six feet high, on one side of which sat the men and on the other side the women. Special seats were provided for the scribes and Pharisees at the eastern end, and the buildings were constructed so the congregation faced the east. A platform was provided for the speaker or preacher, and near it was an ark containing Hebrew copies of the Books of Moses. Though regular rabbis, or preachers, were appointed, others present could be called to address the congregation, and this privilege was extended even to strangers. Synagogues of modern construction are built quite similarly in eastern countries, but in most European and American countries they resemble more nearly the Christian churches. Ezra founded a Jewish council after the Babylonian captivity, known as the *Great Synagogue.* It consisted of 120 members. The purpose was to remodel the religious life and collect the sacred writings of the Jews. See **Sanhedrim.**

SYNCHRONOGRAPH (sĭn'krō-nō-grăf), an apparatus used in telegraphy for the rapid transmission of signals. A metallic disc is mounted on an axis, either the same or another axis than that on which the generator is mounted, and an alternating electric current is supplied to the disc through a brush. A tape that passes between the disc and the brush opens and closes the current. This instrument is used in connection with machine telegraphy, and the number of words transmitted per minute is very high, ranging from 2,000 to 3,500.

SYNOD (sĭn'ŭd), an ecclesiastical councilor assembly for mutual deliberation on matters of general interest, affecting the churches within its jurisdiction and designed for their guidance. The term is used by the Lutheran Church in the United States to describe a supreme council, known as the *general synod,* and a more limited one known as the *district synod.* It is similarly used by the Dutch and German Reformed churches, but the Presbyterians apply it to a council immediately between presbyteries and general assemblies. In this sense the term applies to a body composed of presbyteries or delegates from them. In the Presbyterian Church an appeal may be taken from the presbytery to the synod and from the synod to the general assembly.

SYNTAX (sĭn'tăks), the division of grammar which treats of the construction of sentences. The rules which govern in syntax differ according to the established usage and the languages to which they apply. In the English, which has few inflections, a large diversity of arrangement is not possible, the principle of juxtaposition being applicable to a large extent. In such languages as the Latin and German, which have a large number of inflected words, the relation of the principal elements of sentences can be indicated by changes in the forms of certain words, and the form of construction can be variegated. The correct placing of elements is called *arrangement,* which may be either in the natural or the inverted order. The *natural order* of arrangement is that which is most customary, while the *inverted order* is any departure from the natural order of arrangement. However, the construction of sentences or parts of sentences is governed by the logical relations of the thoughts which are expressed. The construction of sentences from words is known as *synthesis.*

SYNTHESIS (sĭn'thĕ-sĭs). See **Analysis.**

SYRA (sē'rä), or **Syros,** an island of the Cyclades, situated in the Aegean Sea, 20 miles northwest from Paros. The area is 31 square miles. Formerly it had forests of considerable value, but they have been largely cut and the island has been denuded of its fertility. Hills and narrow valleys characterize the surface. It is the site of Hermopolis, the capital of the monarchy which includes the Cyclades, and is an important seaport of Greece. This city is located at the head of a bay on the eastern coast, near the site of the ancient city, and has a large and convenient harbor. The island has a population of 27,350.

SYRACUSE (sĭr'ă-kūs), a city of New York, county seat of Onondaga County, 148 miles west of Albany, on Lake Onondaga, 35 miles south of the east end of Lake Ontario. Direct communication is provided with Albany and Buffalo by the Barge Canal and with Lake Ontario by the Oswego Canal. It has transportation facilities by the New York Central, the West Shore, and the Lackawanna railways. The city is regularly platted, having broad streets that cross each other at right angles, and the location is on a gently rolling site. Fine avenues of trees shade the chief residential streets, and these are beautified by parkings and pavements. Many small parks are located in different parts of the city. On the eastern border is Lincoln Park, a wooded tract of 20 acres, and Burnet Park, including about 100 acres, is located on a hillside in the west. Syracuse is the seat of the State Fair, which is under the management of the State Agricultural Society.

The architecture is substantial, chiefly of brick and stone. Among the important buildings are the county courthouse, the city hall, the Carnegie Library, the post office, the Hotel Syracuse, and the buildings of the Syracuse University. It has a number of hospitals and charitable institutions, including the County Orphan Home, the Old Ladies' Home, and the State Asylum for Feeble-Minded Children. Besides the public library of 171,830 books, it has a fine library in the public schools and a law library belonging to the State. Intercommunication is by an extensive system of electric railways, with which are connected lines that extend to other cities and various points within the State. The waterworks are owned by the municipality. Other utilities include electric and gas lighting, sewerage, and storm water drainage. Many of the streets are paved with cement and asphalt, the latter being used chiefly in the residential section.

Syracuse ranks as the fourth city of the State and is noted as a commercial and manufacturing center. Formerly it produced large quantities of salt from springs near Lake Onondago, and from this fact is due its early industrial development. It has establishments for the manufacture of clothing, typewriters, flour and grist, boots and shoes, iron and steel, and agricultural implements. Other manufactures include soda ash, carbolic acid, tar, ammonia, jewelry, and glassware. It has a large wholesale and export trade and is important as a market for live stock and farm produce.

The Onondaga Indians formerly occupied the region in the vicinity of Syracuse. Isaac Jogues, a Jesuit missionary, visited the locality in 1642. An Indian trading post was established in 1798 and it was soon afterward named Salt Point, from the large salt deposits in its vicinity. The completion of the Erie Canal caused it to grow rapidly, and it was incorporated as a village in 1825. Several villages were united in one corporation in 1847 and named Syracuse. Since then its commercial and educational growth has been constant. Population, 1925, 182,003.

SYRACUSE, an ancient city of Sicily. It was once the most noted commercial center of Southern Europe, but now is greatly reduced in size and importance. The ancient city occupied a large and imposing site on the east coast of the island, measuring fully 22 miles in circumference, when it probably contained fully 750,000 people. The city was founded by Corinthian colonists in 734 B. C., and the Greek Thucydides speaks of it as having been greater than any Grecian city, not excepting Athens. It rose to commercial importance with great rapidity and, after being strongly fortified by four walls, became a stronghold of strategic importance. Colonists were sent from Syracuse to various countries bordering on the Mediterranean. Among its famous rulers were the Elder and the Younger Dionysius, Hiero I., and Hiero II. It successfully repulsed the besieging Athenians in 413 B. C., but the Romans conquered it after a three years' siege in 212 B. C., and subsequently it remained identified with Rome until the decline of the empire. The Saracens captured and pillaged it in 878 A. D., carrying away its treasures, and it soon fell into complete decay. Among the famous buildings of ancient Syracuse were the Agora temple of Zeus Olympius, the Prytaneum, and a theater with a capacity for 24,000 people. In the Prytaneum was a splendid statue of Sappho. The city contained elaborate monuments built to Dionysius the Elder and Timoleum. The ancient harbor was the scene of great naval activity, and traces of its vast extent and improvements still remain.

The modern city of Syracuse is partly on the main island of Sicily and partly on a small island near the shore. The latter is known as Ortygia and is about one mile long and half a mile wide. Most of the streets are narrow and in an unwholesome condition, but it has several fine buildings, including a cathedral, a museum of classical antiquities, and numerous churches, monasteries, and nunneries. The city has a public library and several secondary schools. Among the manufactures are earthenware, drugs, chemicals, wine, and textiles. It has considerable trade in salt fish, wine, salt, oil, and silk textiles.

A railroad line extends from it along the eastern shore of Sicily, and other lines furnish communication with the interior. Population, 1922, 32,894.

SYRACUSE UNIVERSITY, a coeducational institution at Syracuse, N. Y., founded under the auspices of the Methodist Episcopal Church in 1870. It is the successor of Genesee College, which was conducted at Lima, N. Y., from 1849 until 1871. The colleges include those of liberal arts, fine arts, medicine, law, teachers, forestry, agriculture, administration, economics, library, nursing, dramatic arts, and applied science. The master's and doctor's degrees are conferred. The university maintains a summer session of eleven weeks and conducts a line of work at the marine biological laboratory at Wood's Hole, Mass. Lectures on meteorology and climatology are given in connection with the observing station of the United States Weather Bureau. The faculty includes about 500 professors and instructors, and the attendance is 8,500 students. The university has a library of 150,000 volumes and property valued at $5,000,000.

SYR-DARYA (sĭr där'ĭ-ä), **or Sir-Daria,** a river in the western part of Asia, chiefly in Russian Turkestan. It rises in the Tian Shan Mountains of Chinese Turkestan and flows toward the northwest into the Aral Sea. The total length is 1,500 miles. In the upper part it is known as the Narin, where it has many rapids and forms a mountain torrent. The lower course is through an arid region, where a large part of its waters are evaporated during the dry season. Anciently this river was called Jaxartes.

SYRIA (sĭr'ĭ-ä), a political division of Turkey in Asia, forming the coast region along the eastern shore of the Mediterranean. It is bounded on the north by the Taurus Mountains, east by the Euphrates, the Syrian Desert, and Arabia, south by Arabia and Egypt, and west by the Mediterranean. The area is estimated at 108,625 square miles. Population, 1922, 3,518,950.

Description. The region along the shore is mostly sandy, with shallow coastal indentations, but the coast plain narrows toward the north, where Mount Carmel and the Lebanon Mountains occupy the region near the shore. Between the Lebanon and the Anti-Lebanon is the extensive valley of Coele-Syria, through which flows the Orontes River. It receives several confluents and discharges into the Mediterranean at Seleucia. Ranges of mountains traverse the interior in lines almost parallel to the coast. They reach the greatest height in the Lebanon Mountains, which tower from 8,000 to nearly 11,000 feet above sea level. A portion of the Coele-Syria valley is drained by the Leontes River, which flows into the Mediterranean, but the southeastern part lies in the Jordan basin, which has a general inclination toward the south and drains into the Dead Sea. Syria contains considerable tracts of grazing lands, but large parts of it are highly fertile, especially the valleys of Lebanon and the plains of Gaza, Sharon, and Esdraelon. Minerals are not particularly abundant, but there are paying deposits of coal, iron, salt, bitumen, quicksilver, and limestone.

Industries. Tourists notice a peculiar absence of skill in cultivating the soil, an art anciently of great renown in that region. However, within recent years the agricultural art has been showing evidences of improvement, owing largely to the building of several railroads and the return of many Jews to Jerusalem. The principal soil products include hemp, cotton, wheat, barley, rice, tobacco, indigo, and fruits. The chief fruits grown are olives, grapes, and apples. Sheep and cattle raising are important industries in the grazing and mountain regions, while the mixed farming in the fertile districts includes the rearing of horses, camels, and poultry. Silk culture is making considerable advancement and is keeping pace with the development of mulberry groves. The cedar of Lebanon, so famous in history, is still secured, and the country has several species of pine and deciduous trees. The climatic conditions vary greatly in different sections, ranging from cool and pleasant summers in the Lebanon region to the arid and hot seasons in the Jordan valley. From April to October a dry season with scarcely any rain occurs. Syria has been divided by the Turks into several governments and industrial activity is fostered by them to a limited extent. It has few good highways. The manufactures embrace soap, earthenware, silk goods, cotton and woolen textiles, jewelry, glass, and clothing.

Language, Religion, and Literature. The Syriac dialect is a branch of the Aramaic tongue and belongs to the Semitic family of languages, but the official and general language spoken is Arabic. About four-fifths of the people are Mohammedans, and the remainder are Christians and Jews. The Christians comprise Protestants and Greek and Roman Catholics. Protestant missionaries are actively at work through American and European assistance and a college is maintained by them at Beyrout. Protestant and Catholic schools and churches are supported in Jerusalem and many other cities. Syriac is practically a dead language, but it is used as the sacred language among the Christian churches of Syria and Asia Minor, especially in the Greek and several allied churches.

The literature written in the Syriac is classed with the Christian writings and had its rise in the 1st century of our era. Many of the early writings are translations and commentaries on the Bible, and they contain many sacred hymns, liturgies, and prayers. The first complete translation of the Bible into Syriac, called the *Peshito version,* is of great value to scholars. Works in philosophy, history, grammar, nat-

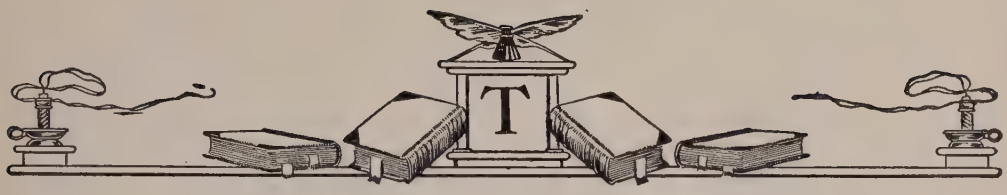
ural sciences, law, and medicine date from the 4th century A. D., but many of these writings are not extant, though it is known that they exercised an important influence in bringing classical learning to the Arabs. Among the Syriac writers of note is Saint Ephraem of the 4th century. The later writers include Jacob of Edessa, Bar-Habraeus, and Bar-Ali.

HISTORY. The history of Syria dates from remote antiquity. Damascus was a city of importance in the time of Abraham, about 2000 B. C., but about 740 B. C. the Assyrians conquered it and made Syria tributary. The coast region west of the Lebanon Mountains was occupied by the Phoenicians, who founded and defended the powerful commercial cities of Sidon and Tyre, but they, too, became at least partially tributary to Assyria. Other peoples of note include the Moabites, Canaanites, Ammonites, and Anakims, who occupied the region along the Jordan. The Israelites under Joshua invaded Palestine about 1500 B. C. and held the country with varying success until about the time of Christ, when it became a part of the domain of the Romans. In the meantime the Israelites were carried into Assyrian captivity, in 721 B. C., and later into Babylonia.

Syria was conquered by the Persians and subsequently by the Greeks under Alexander the Great. After the division of Rome it was a part of the Byzantine Empire, but in 636 A. D. the Arabs conquered it. The Seljuk Turks occupied it in 1078 and later it was held by the Crusaders, who maintained their kingdom at Jerusalem until 1187. The Mamelukes joined it to Egypt, but it finally became a territory of the Ottoman Turks in 1517. Mehemet Ali conquered it in 1833, but the great powers of Europe restored it to the Turks in 1840. The Druses and Maronites began a factional war in 1860, which the Turks were unable to quash, but peace was restored under European sanction by a French military force. The region is now divided into three governments. One has its capital at Beyrout and one is governed from Damascus. The region of Lebanon is governed by a Christian mutessarrif from Beit-ed-din.

SYRIAN CHRISTIANS, a branch of the Christian Church, officially called the Church of the Syrian Rite. It is most strongly represented in Syria, but controversies in the 4th century caused it to be divided into numerous denominations. The leading branches include the Jacobites in Mesopotamia, the Maronites in Lebanon, the Nestorians in Kurdistan, and the Christians of Saint Thomas in India. In the 4th century this church had several million members and was a united body, and the total membership at present does not exceed that number.

SZEGEDIN (sĕg'ĕd-ēn), a city of Hungary, at the confluence of the Maros and Theiss rivers, 105 miles southeast of Budapest. It is an important railroad junction. The surrounding country is fertile, producing large quantities of corn, tobacco, and fruits. It has manufactures of soap, matches, leather, tobacco products, salt, soda, cotton and woolen goods, machinery, and lumber products. The principal buildings include the government offices, the superior law court, numerous public and secondary schools, and several convents and churches. Szegedin has a large railroad and river commerce, the articles of trade being manufactures, live stock, cereals, and lumber. The city stands in a marshy plain and is defended by a fortress built by the Turks in the 16th century. An overflow of the Theiss River caused much damage in 1879, but since then vast embankments and wharf improvements have been made to protect against high water. The inhabitants consist almost entirely of Magyars and Slavs. Population, 1922, 126,643.



T TABERNACLE

T, the twentieth letter and the sixteenth consonant of the English alphabet. It is a sharp mute and is closely associated with *d,* the two being frequently interchanged in some languages. In German it is quite similar to *z,* as in Pestalozzi. It is made by placing the tip of the tongue closely against the front part of the palate and then giving a quick and strong emission of the breath. In some words, as in nation, action, and portion, it has the sound of *sh.* It is silent in some words, as in *castle, listen,* and *christen.*

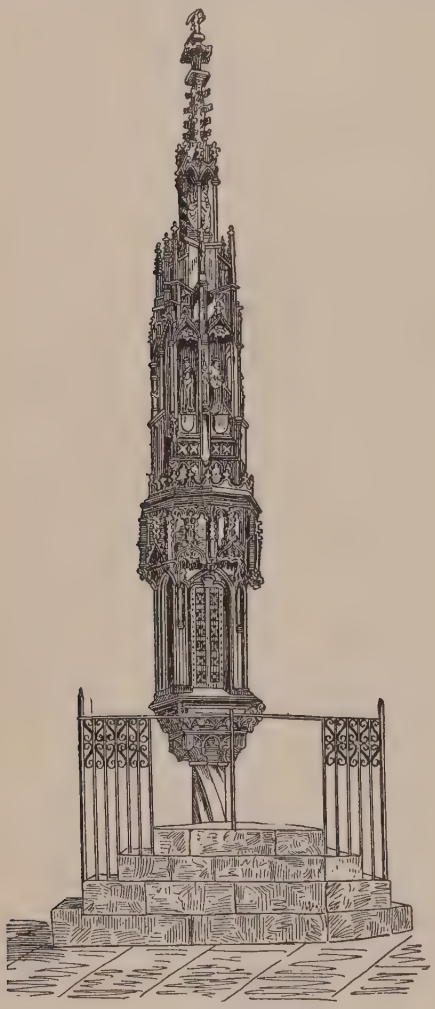
TAAL (tä'äl), a town of the Philippines, in Luzón, on the Transipit River, near the Gulf of Balayán. It is connected by a bridge with Lemeri, on the opposite side of the river, and is about fifty miles south of Manila. Formerly the town was located on the bank of Taal Lake, in which the volcano Taal is situated, but numerous eruptions caused it to be removed farther south. It has a large trade in cotton, sugar, coffee, and fish. Population, 1922, 33,550.

TABARD (tăb'ĕrd), a kind of tunic or mantle worn as a protection from the weather during the Middle Ages. Usually it was worn over the armor, when it was decorated with the arms of the wearer. The name *Tabard* was applied to an inn of London, England, in the 14th century. It was located on High Street, Southwark, and was the starting place for the pilgrims mentioned by Chaucer, when they went upon their journey to the shrine of Thomas à Becket. The sign of the inn was a tabard, or sleeveless jacket.

TABERNACLE (tăb'ĕr-nà-k'l), a tent or sanctuary constructed under the direction of Moses in compliance with divine authority. The tabernacle was used while the Israelites were in the desert as a sign that God dwelt among his people. Freewill offerings were solicited to obtain materials for its construction, and in response the Jews brought precious stones, gold, silver, skins, cloth, spices, and other material. It was built in the form of a parallelogram, 45 feet long, 15 feet wide, and 15 feet high. The material was acacia or shittim wood, including 48 boards, of which 20 boards were on the two sides toward the north and south, while six boards were on the west end, and only two on the east end, thus leaving an opening toward the east. Golden rings were used to fasten the upright boards together, while the ends were set into silver sockets, and the upper covering was made of carpet. A court 75x150 feet surrounded the tabernacle, and in the eastern half of the court was an altar for burnt offerings. Between the altar and the tabernacle was a laver or basin used by the priests to wash their hands and feet before passing into the sanctuary, its entrance being covered by a costly curtain which contained woven figures of cherubs. The interior of the tabernacle was divided by a curtain into two compartments, the outer called the *sanctuary* and the inner the *holy of holies.* Near the center of the sanctuary was the altar of incense, on which incense was burned by the high priest each morning and evening, while toward the north side was the gilded table of showbread, and in the southern part the golden candlesticks or candelabra. The holy of holies contained a gold-plated and gold-lined box of acacia wood, called the *ark of the covenant,* and in it were the ten commandments written on two tables. The ark of the covenant was surmounted by the two cherubs and between them was the Shekinah, a figure to symbolize the presence of Jehovah.

The people gathered in the east end of the court to worship, while only the priests entered the sanctuary, and this but twice daily, in the morning to extinguish the lights and in the evening to light them. The holy of holies was entered by no one but the high priest, who went into it but once a year, on the great day of atonement. When the Israelites moved from place to place, the Levites took charge of the tabernacle. Moses first set it up on the first day of the second year after the exodus from Egypt. It was located at Shiloh soon after the Israelites reached Canaan, but in the time of Saul it was at Nod, and when Solomon became king it was at Gibeon. The temple of Solomon superseded it, but that king provided a place for it in the temple, thus making Jerusalem the central place of Jewish worship. The feast of the tabernacle was one of the three leading Jewish festivals, and its celebration required the

presence of all the males at Jerusalem. It was held to commemorate tent life in the wilderness, and on this occasion the people dwelt on their housetops or in temporary dwellings. In the later period the feast partook of thanksgiving for the completion of the harvest and the



TABERNACLE AT BARTFELD, HUNGARY.

vintage. In the latter sense it was called the *feast of ingathering*. This festival was held in autumn, lasting eight days, the first and eighth days being holy convocations.

In the Roman Catholic Church, a tabernacle is a receptacle in which to retain the Eucharist. Some of these structures are finely ornamented with metal and marble. Bartfeld, Hungary, has a noted tabernacle of this kind.

TABLELAND. See **Plateau.**

TABLE MOUNTAIN, or **Tabelberg,** a mountain of South Africa, in Cape Colony, situated near Cape Town. It has an elevation of 3,560 feet. The summit furnishes a fine outlook across the city and Table Bay. It is so named on account of its peculiar shape and level top. White clouds, termed *tablecloth,* frequently envelop the summit.

TABOO (tȧ-bo͞o′), the name applied by the natives of the Polynesian Islands to any object which is consecrated for a special religious purpose. In some instances they extend the name to certain political prohibitions exercised by the chiefs. All things reserved for their idols are taboo and no one but the priests is permitted to touch them. The prohibition is especially incumbent upon women and such men as are regarded profane. Formerly the chiefs were accustomed to taboo certain articles of food and clothing, especially those they desired to reserve for their own use, and this practice occasioned distress by depriving the common people of what belonged to them. The word is now used to signify a total prohibition of intercourse with or approach to the thing tabooed.

TABOR (tā′bẽr), **Mount,** a famous mountain in northern Palestine, rising abruptly in the plain of Esdraelon to a height of 1,900 feet. It furnishes a magnificent view of the Holy Land. From its summit the tourist may catch a gleam of the Sea of Galilee fully fifteen miles distant, while the adjacent plains and a large part of the Jordan basin may be viewed. Fine forests of oak and pistacias grow on its slopes and summit, in which wolves, lynxes, and reptiles find a haunt or retreat. Tabor was long thought to be the scene of Christ's transfiguration, but it is now reasonably clear that that event occurred farther north and that a fortified city occupied the region in its vicinity for centuries. The Crusaders built many fine churches and monasteries on Mount Tabor and traces of them still remain. Napoleon I. gained a victory over the Turks on its slopes.

TABRIZ (tȧ-brēz′), or **Tabreez,** a city of Persia, capital of the province of Azerbijan, on the Aji River, 38 miles east of Lake Urumiah. It occupies a fine site 4,000 feet above sea level, is fortified by a brick wall with an outer ditch, and may be entered through seven gates. Lofty hills surround three sides of the city, while the other side is in the form of a fertile and extensive plain. The city is well platted and cleaner than most cities of the East, but many of the buildings are poorly constructed and lighted, and little provision has been made for sanitary comforts. Among the manufactures are jewelry, carpets, silk and cotton goods, leather, furniture, earthenware, and utensils. The leading exports include shawls, spices, dried fruits, carpets, and raw silk, and there are imports of sugar, wines, and fabrics. It has a large interior and foreign trade and is the gathering center of many caravans. Among the principal buildings are numerous mosques and bazaars, an arsenal, several baths, and a number of government houses.

Tabriz is the Tauris of ancient times and is

one of the oldest cities of the East. Tiridates III. made it the capital of Armenia in 297 A. D., when it was considered an old city. The site was enlarged and beautified by parks and gardens under the direction of Zobeidah, wife of Harun-al-Raschid, in 791. In 1293 Marco Polo made a visit to Tabriz. Timour sacked the city in 1392 and soon after it became a possession of the Turkomans, but fell to the Persians in 1500. Earthquakes are of frequent occurrence, which accounts for most of the buildings being low. A large per cent. of the inhabitants are of Turkish descent. Population, 1922, 180,500.

TACITUS (tăs'ĭ-tŭs), **Publius Cornelius,** Roman historian, born about 55 A. D.; died probably in 117. Little is known of his early life, but it is thought that his father was Cornelius Tacitus, a Roman *eques,* or horseman. He was first appointed to office by the Emperor Vespasian. Titus raised him to the rank of questor and Domitian made him pretor in 88, while under Nerva he succeeded to the office of consul. Previous to that, in 78, he had married the daughter of Caius Julius Agricola, the latter dying in 83 while both Tacitus and his wife were absent from Rome. Tacitus succeeding to the office of consul under Nerva, in 97, as successor to T. Virginius Rufus, he delivered his famous funeral oration at the tomb of the latter. He and the younger Pliny were intimate friends, and this circumstance caused the former to write eleven letters, in which much valuable history and incidents of public life are treated. Among his numerous historical writings are "Life of Agricola," a masterpiece of noble sentiment; "Annals," a work in sixteen volumes covering the period of Roman history from the death of Augustus, in 14 A. D., to the death of Nero, in 68 A. D.; "History," including five volumes that cover the period from the consulship of Galba, in 68, until the ascension of Vespasian, in 70; and "The German People," a treatise of the geography and history of the Germans occupying the region of the Rhine. Another work of great historic value is his "Dialogue on Orators." The writings of Tacitus are particularly valuable because of his care in aiming to give accurate information. They are characterized by a concise style, close discernment of character, and high moral tone. A number of his works are extant, but some of them have been disfigured by interpolations.

TACOMA (tà-kō'mà), a city of Washington, county seat of Pierce County, 28 miles west of south of Seattle. It is situated on Commencement Bay, an inlet from Puget Sound, near the mouth of the Puyallup River. The city has transportation facilities by the Northern Pacific, the Great Northern, the Canadian Pacific, the Chicago, Milwaukee and Saint Paul, and other railroads. It has a secure and spacious harbor, from which many steamship lines sail to carry coastwise and trans-Pacific trade. The site rises gradually from Commencement Bay, which is about a mile wide and five miles long, and the streets traverse an undulating tract. The surrounding country has deposits of coal and extensive interests in lumbering. It produces grain, hops, fruits, and vegetables. Southeast of the city is Mount Rainier, locally called Mount Tacoma, in Mount Rainier National Park. It has an elevation of 14,526 feet and presents a picturesque sight, having forest-covered slopes and a snow-capped summit.

The city is finely platted, having wide and straight streets, many of which are substantially paved with stone, brick, and asphalt. The parks include about 700 acres, of which Point Defiance is the most noteworthy, being the largest and beautifully ornamented with natural scenery of great beauty. Among the principal buildings are the county courthouse, the city hall, the Chamber of Commerce, the Winthrop Hotel, the Tacoma Theater, the Union Club House, and the Tacoma Hotel. It is the seat of Puget Sound College, the Annie Wright Seminary, and the Pacific Lutheran College. Tacoma is noted for its splendid system of public schools, which range from the primary to the high schools of recognized standards. The Carnegie public library contains about 38,000 volumes, and the Ferry Museum of Art contains a choice collection. Among the institutions are the city and county hospitals, the State insane asylum, and the Saint Joseph's Hospital. The municipality owns and operates the waterworks and the electric light plant. Intercommunication is provided by an extensive system of street railways, which is connected with lines that reach Seattle and other points within the State.

Tacoma has a large wholesale and jobbing trade and is one of the leading business centers of the Pacific coast. An abundance of timber and coal is obtained for manufacturing purposes in the vicinity. It has large smelting and shipbuilding interests. The general manufactures include furniture, flour and grist, lumber products, hardware, engines, mattresses, bread, cereals, and machinery. It has a large trade in coal, packed meat, lumber, grain, flour, fish, and fruits. Salmon fishing is carried on extensively on Puget Sound and much of the output is canned for the market. The wharf facilities, grain elevators, and packing establishments are among the largest in the West. The locality was settled in 1868, when Old Tacoma was founded, and New Tacoma was platted the following year. In 1873 the Northern Pacific was completed, and the city of Tacoma was organized in 1874. It became the county seat in 1880. Few cities of America have had a more rapid and substantial growth in wealth and commercial importance. Population, 1900, 37,714; in 1920, 96,065.

TACONIC MOUNTAINS (tà-kŏn'ĭk), a range of highlands in the eastern part of New York, extending a short distance across the

border into Vermont and Massachusetts. These mountains trend from the Hudson toward the northeast, assuming their greatest height after they cross the border, and in Vermont merge into the Green Mountains. Mount Equinox, in Vermont, has a height of 3,816 feet, and Greylock, in Massachusetts, is elevated 3,535 feet above sea level. These highlands give rise to the name Taconic System, which includes a series of rocks of a metamorphosed character that predominate in the region.

TACTICS (tăk'tĭks), the art of disposing military and naval forces in order for battle, or conducting and arranging troops for action on the scene of war. The term *elementary tactics* is applied to the instruction in military art, while *grand tactics* has reference to the maneuvers on the field of battle. Since armies are divided into infantry, cavalry, and artillery, each class has a form of tactics peculiar to itself.

Artillery has a large field of action and is a powerful instrument in modern warfare. The chief duty is to protect the infantry of its own country and destroy that of the enemy. This it possible from the fact that it has a great range and may mass itself to support the action of the other arms. Although it must cease firing when flanking or changing its position, modern implements permit it to do so with considerable speed and accuracy. Usually a high point is selected with the view of reaching the position of the enemy and at the same time covering effectively the retreat of its own army. Usually the position is concealed on the sheltered side of a hill and the firing is indirect upon the enemy. Officers stationed at convenient points are able to determine the direction and range of the shots, and by signals indicate the same to those who have charge of the gun. Artillerymen are carefully trained and thoroughly familiar with the theory of projectiles, and from extensive practice are able to locate their batteries and direct the fire with great precision. A field army usually has both light and heavy artillery, the former comprising field and horse batteries and the latter guns of position. Mortar and Howitzer batteries are classed as field artillery and are used for curbed and for high-angle fire. Guns of position are of long range. Usually the artillery moves in columns of platoons, but when within the range of firearms it appears only in columns of sections, thus lessening the danger of excessive losses.

Cavalry has the advantage of being able to move rapidly. This branch of the army is employed chiefly to protect the infantry and to obtain information. When the enemy is to be pursued or the infantry is required to retreat, the cavalry is able to be of great service. Though important as a division of the army, its use in the battlefield is limited. On an open plain it is able to advance upon the enemy, but this cannot be safely done if there is danger of exposure to artillery fire. Since lances and swords are the principal arms, the cavalry is effective only at short range, and the purpose is to make a sudden and vigorous attack. Where two forces of cavalry meet in combat, the conflict sometimes results in a hand-to-hand conflict, but the encounter is usually of short duration. Cavalry attacks are sometimes made upon the artillery, but only where the strength of the enemy is quite well known, and it is the aim to pass to the rear so as to make the attack at the unprotected side of the batteries. Cavalry attacks upon infantry must necessarily be sudden, else the fire of the enemy causes losses and demoralization before the attack can be made effective. The cavalry, like all other divisions of the fighting forces, is aided by the use of flying machines and machine guns, the sizes and forms being adapted to the use desired.

Infantry is usually effective in firing at a distance of 900 yards, but the fire is more decisive at 500 yards. This division of the army can act independently and is able to act more speedily than any other. Usually the movement is in columns to the firing zone, where the line is single or open, this being essential to avoid the destructive effect of a volley. Trenches and embankments are built in long lines, usually parallel to each other at varying intervals, and the men lie upon the ground as they fire upon the enemy. Advances are made rapidly from one embankment to another, and the firing is either in volleys or each soldier fires at will a definite number of rounds. While each division is previously assigned and the plan of battle is carefully mapped out, each man has certain independence in thinking and in acting. A careful outlook is kept for the exposed and weakened positions of the enemy until the climax of battle is reached, which is frequently at a distance of 500 yards. Frequently it occurs that the encounter is at very close range, when the hand grenade and bayonet are used for attack and defense. Although warfare has been greatly influenced by the invention of powerful explosives and rapid-firing guns, the tide frequently turns upon efficiency at close range. According to Meckel, the noted German tactician, "The laurel of victory still hangs on the point of the bayonet."

Naval tactics are concerned with the proper groupings and movements of ships and other naval weapons. It is the purpose of a commander to hold the enemy at every point, and with this end in view he endeavors to break the line of battle formed by the antagonist. Naval tactics are usually classed in two divisions, including *torpedo tactics* and the handling of ships and weapons, the latter being termed *gunnery*. Torpedoes and submarine navigation play an important part in modern naval contests and close quarters are usually

(Opp. Taft) WILLIAM HOWARD TAFT.

avoided to escape the effect of torpedoes. If an attack is made upon a fleet or coast defenses, the ships sail in an ellipse. A fleet of twelve ships may be divided into three squadrons of four ships each, or the entire fleet may advance abreast, when the arrangement is termed a *line.*

The navies are subdivided differently into fleets and each fleet, into squadrons. Usually a squadron consists of from six to twelve ships, and half a squadron is called a *division.* Two ships of a squadron comprise a *section.* When the advance is in single file it is said to be in *column,* and when the movements are diagonal to the line of the ships they are said to be in *echelon.* The ships must continue in motion in order to keep them under control and they cannot be turned suddenly. It is impossible to stop a heavy ship moving at high speed in less than a distance several times her length. These facts have made it necessary to formulate plans of movements during battle. The requirements are that the movement be as simple as possible, that changes in speed be avoided, that ships should be grouped according to their characteristics, and that the fleet be concentrated until the attack is made, when it should be in a position to form quickly as directed by the superior officer.

TADOLINI (tăd-ō-lē'nē), **Adamo,** sculptor, born in Bologna, Italy, in 1789; died in 1872. After studying in the Academy of Bologna, he settled at Rome. He developed remarkable skill in drawing and sculpturing at an early age and in 1812 gained a prize by exhibiting "Dying Ajax." Other sculptures designed and executed by him include "Abduction of Ganymede," "Statue of Washington," and "A Bacchante." "The Archangel Saint Michael," a fine marble group, was sold to an American for $38,000.

TAFT, Lorado, sculptor, born in Elmwood, Ill., April 19, 1860. After graduating from the University of Illinois, in 1879, he studied art at Paris for three years, exhibiting in the meantime several sculptures in the salons. He established himself in Chicago in 1886, where he soon after became instructor in sculpture in the Art Institute and lectured before university extension classes on painting and sculpture. His works are numerous and many of them have been universally praised for their symbolical beauty. Among the most noted are a statue of Schuyler Colfax, now in Indianapolis, statue of General Grant, reliefs for the Michigan regimental monument on the battlefield of Gettysburg, and decorations for the horticultural buildings of the Columbian Exposition. The last mentioned include the two beautiful groups entitled "The Painting of the Lily" and "The Sleep and Awakening of the Flowers."

TAFT, William Howard, public man, born in Cincinnati, Ohio, Sept. 15, 1857. He was educated at Yale University and in 1880 graduated at the law school of Cincinnati College. From 1881 until 1882 he was attorney of Hamilton County, became collector of internal revenue in the latter year, and in 1887 was made judge of the circuit court of Ohio. In 1890 he was appointed solicitor-general of the United States, serving until 1892, when he was made judge of the United States circuit court for the sixth circuit. President McKinley appointed him chairman of the commission to devise and establish civil government in the Philippines, and on June 5, 1900, he was made the civil governor of the islands. In 1903 President Roosevelt named him as successor of Elihu Root as Secretary of War, of which office he took charge in 1904. He was made president of the American National Red Cross in 1905. President Roosevelt sent him to Cuba in 1907 to restore order, at which time a rebellion was in progress on the island, and in the same year he visited Panama, China, Germany, Russia, and other countries of Asia and Europe. In 1908 he was elected President as a Republican, defeating Bryan, his Democrat opponent. He was the Republican nominee in 1912, but was defeated by Woodrow Wilson, receiving only eight electoral votes, those of Utah and Vermont. On June 30, 1921, he became chief justice of the U. S. Supreme Court.

WILLIAM HOWARD TAFT.

TAGANROG (tä-gän-rôk'), a seaport city of Russia, in the government of Ekaterinoslav, on the north shore of the Sea of Azov. The harbor is too shallow for large ships to land, but they anchor and unload by means of barges within half a mile of the quay. The surrounding country is highly fertile and is penetrated by several railroad lines, thus giving the city a large export trade in corn, wheat, live stock, wool, leather, and dairy products. Among the manufactures are machinery, clothing, cotton and woolen goods, hardware, and earthenware. The fisheries are an important industry, and both fresh and salt fish are transported to the northern markets. Most of the buildings are wooden structures, but there are a number of massive and substantial buildings, including an imperial palace, a Greek monastery, several hospitals, many schools, a cathedral, and a number of other churches. The city was founded by Peter the Great in 1696. It contains a fine monument to Alexander I. Considerable damage was done in 1855 as a result of the Crimean War. Population, 1922, 61,786.

TAGLIONI (täl-yō'nē), **Marie,** eminent ballet dancer, born in Stockholm, Sweden, April 23, 1804; died in Marseilles, France, April 23, 1884. She was the daughter of Filippo Tagl-

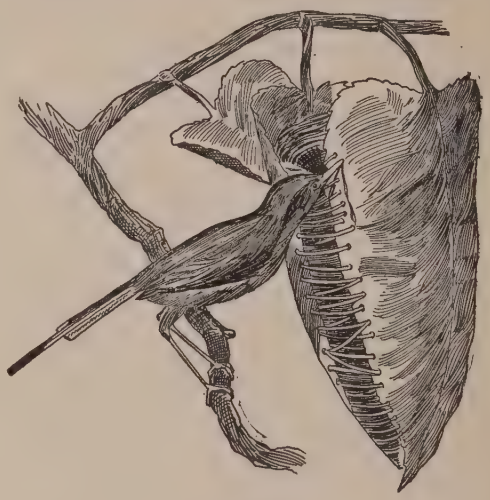
ioni, an Italian ballet master, and under his guidance developed remarkable skill, making her début as a public entertainer at Vienna in 1822. In 1827 she located in Paris and in 1832 married Count Gilbert de Voisins. After traveling extensively and giving entertainments in the leading cities of Europe, the family settled in London, where her large fortune was lost in speculation. Subsequently she supported herself by giving lessons in deportment at London and later at Marseilles. Her style was known as the ideal, and she appeared to the best advantage in "La fille du Danube."

TAGUS (tā'gŭs), the largest river in the Spanish peninsula, which rises near the boundary of Aragon and New Castile and, after a general course of 542 miles toward the southwest, flows into the Bay of Lisbon, an inlet from the Atlantic. Much of its basin is dry and barren and its banks are precipitous in many places. It is navigable for a distance of 115 miles. Among the principal tributaries are the Jarama, Zezere, and Zatas rivers. Lisbon, Santarem, and Toledo are the chief cities on its banks.

TAHITI (tä'hē-tē), one of the Society Islands, the largest island of the group. It consists of two parts, having a total length of 32 miles, these being connected by an isthmus three miles wide. The area is given at 412 square miles. The surface is diversified by a number of ridges, but it has a considerable area of fertile valley coast lands. Among the chief productions are sugar, arrowroot, cocoanut, dyewoods, domestic animals, cotton, and cereals. Papeete, or Papéiti, the capital, is the principal town and trading center and has a safe harbor. France established a protectorate over Tahiti and the Society Islands in 1844. Population, 1922, 10,834. See **Society Islands.**

TAHLEQUAH (tä-lē-kwä'), a city of Oklahoma, in Cherokee County, 80 miles northwest of Fort Smith, Ark. It occupies a fine site in the valley of the Illinois River, on the Saint Louis and San Francisco Railroad, and is surrounded by a productive farming and stock-growing country. The principal buildings include the Tahlequah Institute, the courthouse, the high school, and the Cherokee National Library. It has manufactures of earthenware, utensils, and wearing apparel. It has a growing trade in farm produce, dairy products, fruits, and general merchandise. The place was settled in 1836 and incorporated in 1889. It was the capital of the Cherokee Nation before that region was united with Oklahoma to form a State. Population, 1900, 1,482; in 1920, 2,271.

TAILOR BIRD, a genus of birds of the warbler family, so named from their habit of sewing leaves of cotton or other substances to form a receptacle for the nest. The nest proper is made of cotton, wool, loose hairs, and twigs, and four eggs are usually laid. These birds include a number of species, most of which are native to the East Indies and Southeastern Asia. The common tailor bird measures about six inches exclusive of the tail, which is about as long as the body. The upper part is greenish



TAILOR BIRD.

and the lower part is whitish. It is the most ingenious species in sewing together the leaves, usually taking two leaves at the extremity of a twig and stitching them by passing vegetable fibers through holes made by the bill.

TAINE (tān), **Hippolyte Adolphe,** historian and critic, born in Vouziers, France, April 21, 1828; died in Paris, March 6, 1893. After attending the College of Bourbon, he entered the Paris École Normale, and was for some time a teacher of history and aesthetics of art. A doctor's degree was conferred upon him in 1853 and he soon after devoted himself entirely to literature. His "Essay on Livy" won the Academy prize in 1854, and the following year he published "Travels in the Pyrenees." In 1864 he completed his "History of English Literature," a work of remarkable force and historical value. Oxford University conferred a degree upon him in 1871, and he was made a member of the French Academy in 1878. The writings of Taine take high rank because of their excellent composition, beautiful style, and the conscientious spirit of the writer. Many of them have been widely translated. Among his numerous writings not mentioned above are "Philosophy of Art in Greece," "Origin of Contemporary France," "French Philosophers of the 19th Century," "Critical and Historical Essays," "Philosophy of Art in Italy, Greece, and the Netherlands," "Ancient Régime," "The Revolution," "Modern Régime," "On the Intelligence," and "Notes on Paris."

TAI-PINGS (tī'pĭngs'), the followers of Hung-Sew-Tseuen, a professed Christian who was at the head of a rebellion in China from 1850 to 1864. The leader of the rebellion was

popularly called Teen Wang, or Heavenly King. He endeavored to expel the reigning Tartar dynasty and in its stead establish a Chinese dynasty, to be called Tai-ping, or Great Peace. Peking had been captured by the allied French and English army in 1860, and the treaty exacted made it of commercial interest to these governments and to the United States to restore and preserve order. Gen F. T. Ward, an American, was given command of the allied forces, under whom the rebels were defeated at Shanghai in 1860. On the death of General Ward, in 1862, C. G. Gordon, commonly called Chinese Gordon, was placed in command and the insurrection was finally crushed in 1867. The protracted war damaged many of the commercial cities and wrought much injury in several of the best provinces.

TAIT (tāt), **Archibald Campbell**, ninety-second Archbishop of Canterbury, born in Edinburgh, Scotland, Dec. 22, 1811; died Dec. 3, 1882. He studied at Glasgow University and Oxford, where he became tutor and fellow. As a tutor he joined three others in opposing the Tractarians and ranked as a leading opponent of that movement. In 1842 he was made head master of Rugby to succeed Dr. Arnold. He was appointed dean of Carlisle in 1849, bishop of London in 1856, and Archbishop of Canterbury in 1868, thus becoming primate of all England. Tait established the evening services in Saint Paul's Cathedral at the time he was bishop of London and supported the public worship regulation act in 1874 while primate. His numerous writings include "Harmony of Revelation and the Sciences," "Dangers and Safeguards of Modern Theology," "Church of the Future," "Present Condition of the Church of England," and "Word of God and the Ground of Faith."

TAJ MAHAL (tăzh mȧ-häl′), a beautiful tomb and monument near the city of Agra, India, which was constructed by Emperor Shah Jehan as a mausoleum for himself and his favorite wife, Noor Mahal. It occupies a fine situation just outside the wall of the city, about a mile east of the fort. The structure is of white marble. The main features include the mausoleum in the center, above which a beautiful dome rises, and at each corner is a smaller dome or minaret. Both the exterior and interior are elaborately decorated, and on the inner walls are many passages from the Koran written in solid stones. The general design, elaborate perfection, and complexity of grace are alike remarkable. It is estimated that 20,000 workmen were employed in its construction for 22 years and that it cost $4,200,000.

TAKU (tä-kōō′), a town of China, in the province of Chi-li, thirty miles east of Tientsin. It is finely located near the mouth of the Pei-ho River and is strongly fortified. The forts of Taku were captured by the British and French fleets in 1859. At the time of the Boxer rising, in 1900, they were attacked and captured by the allied troops.

TALC (tălk), a granular mineral with a shining luster, quite greasy to the touch, and inclined like mica to separate into sheets. It consists quite largely of magnesia and silica, usually in the proportion of 33 parts of the former to 62 of the latter, and nearly 5 per cent. of water. The color ranges from white to blackish-green. It is either transparent or translucent when in thin sheets. Different varieties are called potstone, soapstone, and steatite, or French chalk. Talc is used for hearthstones, paint, and wall plaster. In a powdered state it is useful as a lubricant. The Chinese employ it to some extent instead of glass in windows. Steatite is used to some extent instead of chalk. The richest talc mines occur in North Carolina, where the mineral is found in large strata, and the product scales much like slate. It is found in New Hampshire, Vermont, Maryland, Massachusetts, Virginia, and New Brunswick. In 1908 the production of the United States was 54,800 tons, besides which a small quantity was imported. The larger importations are from Canada.

TALCA (täl′kȧ), a city of Chile, capital of the province of Talca, 135 miles south of Santiago. It is situated on the Calaro River, about 45 miles from the coast, and is on the Santiago-Concepción Railway. The manufactures include woolen blankets, clothing, cigars, and machinery. It has a large trade in wheat, fruits, and live stock. Population, 1922, 41,878.

TALENT (tăl′ẹnt), a unit of weight and money in ancient Greece. The talent as a unit of weight was the highest denomination in the system of Greece, equal to about 82 pounds avoirdupois. A talent of different denomination was used by the Hebrews and Babylonians. The Greek talent as a monetary unit was valued at about $1,000, and the Sicilian talent, sometimes called the *little talent*, was of gold and weighed about three-fourths of an ounce avoirdupois. As a monetary unit the Greek talent was divided into 60 *minus* and 6,000 *drachmas*.

TALISMAN (tăl′ĭz-mạn), a figure cast in metal or engraved upon stone, supposed to confer on its possessor supernatural powers. The talisman was made at a particular hour and under the influence of certain planets, and it was supposed to have a favorable influence in averting disease and calamity. It differs from the amulet in that the powers of the latter are passive and only preservative from harm and injury, while the talisman, prepared under a favorable conjunction of planetary influences, could subject to him the elements and enable him to pass through the air or over the seas. It was thought effective in winning the affection of a beloved object and to strike an adversary with a deadly blow with entire safety of the possessor. Advancement in educational art has caused the talisman to be discredited in civilized

countries, but some lingering traces of the same superstition are still left in the charms which are supposed to bring good luck. Images of saints and rosaries were employed in the Middle Ages as talismans. The medicine bag of the North American Indian and the fetich of the African are forms of talismans.

TALLADEGA (tăl-lȧ-dē'gȧ), a city of Alabama, county seat of Talladega County, sixty miles east of Birmingham, on the Southern and the Louisville and Nashville railways. It is surrounded by a fertile farming and fruit-growing country. Large quantities of coal, iron, and marble are obtained in the vicinity. It has the Presbyterian Orphans' Home, the Talladega College, and the State schools for the deaf, dumb, and blind. The chief buildings include those of the county and several fine schools and churches. It has manufactures of hosiery, cotton goods, rope, flour and grist, fertilizers, and machinery. The public utilities include waterworks, sewerage, and electric lighting. General Jackson defeated a force of Creek Indians on the site of Talladega in 1813, when about 300 Indians were slain, while the Americans lost about 100 men. Population, 1900, 5,056; in 1920, 6,546.

TALLAHASSEE (tăl-lȧ-hăs'sē), the capital of Florida, county seat of Leon County, 25 miles north of the Gulf of Mexico, and 163 miles west of Jacksonville. Communication is furnished by several surfaced highways and the Seaboard Air Line, and the Georgia, Florida and Alabama railroads. It is surrounded by a fertile farming and fruit-growing region, which yields large quantities of cotton, tobacco, and tropical fruits. The principal buildings include the State capitol, the county courthouse, the Walker Library, the Masonic Temple, the Cherokee Hotel, the post office, the Centennial building, the State office building, and the public high school. Among the manufactures are tobacco, bread, woodenware, and utensils. The place has systems of waterworks, electric lighting, and sanitary sewerage. It became the territorial capital in 1822, but was not platted until 1824, and the capitol building was begun in 1826. Near the city is the old Spanish fort of San Louis. Population, 1925, 6,415.

TALLEYRAND-PÉRIGORD (tăl'lĭ-răn'dpȧ-rē-gôr'), **Charles Maurice, Prince of,** eminent diplomatist, born in Paris, France, Feb. 13, 1754; died May 17, 1838. He was the eldest son of the Count of Talleyrand and would have been trained for a military life, but this became impossible on account of being lamed while yet a child. He was brought up by strangers, as was customary in that time, and, after attending the College of Harcourt until 1770, he was admitted to the Seminary of Saint Sulpice. His devotion to study prepared him for early admission to the Sorbonne, and in 1780 he was made agent general of the French clergy. He was consecrated bishop of Autun in 1788 and the following year was elected a member of the national assembly, of which he became president in 1790. In the same year he joined 300 priests to celebrate the fall of the Bastille, but was soon after excommunicated by the Pope and never again resumed his profession.

He was sent on a mission to England in 1792 with the view of effecting a conciliation, but on the fall of Louis XVI. was proscribed for intriguing in favor of the royalists. The alien act required him to leave England and he sailed, in 1794, to the United States, where he engaged in a number of successful speculations. His name was stricken off the list of exiles in 1796, thus permitting his return to France, where he became minister of foreign affairs. He used that position in favor of Napoleon, who recognized in him a powerful supporter and an able diplomat. It was his influence that reconciled a majority of the Directory to Napoleon and, after the fall of that body on Nov. 10, 1799, he promoted the successful organization of the consulate.

Talleyrand-Périgord was again made minister of foreign affairs under the new order of things, and as such furthered the diplomatic schemes of Napoleon, who was fast attaining mastery. In 1804 the empire was established and he was its grand chamberlain, and two years later was made Prince of Benevento. The two became estranged after the Peace of Tilsit in 1807, but the interview between Napoleon and Alexander of Russia at Erfurt, Germany, in 1808, proved that he still had marked influence, as also did his opposition to the Spanish War. In 1814 he was largely instrumental in bringing about the abdication of Napoleon, and for that service was rewarded by Louis XVIII. with the third appointment as foreign minister. In that capacity he concluded a secret treaty with Austria and England and, when the allies entered Paris, in 1815, he became president of the council. Opposition to the conditions imposed by the allies upon France caused him to resign the office and retire to private life, but he still remained an important advisory factor among leading statesmen. He was offered the position of foreign minister a fourth time in 1830, shortly after Louis Philippe had ascended the throne, but this he declined and accepted in its stead the office of ambassador to London, in which capacity he concluded a valuable peace treaty between the two nations, but retired finally from public life in 1834. His last two years showed that he was in sympathetic touch with the people of France, and during his final illness was visited by the king and many of the leading statesmen. His memoirs were published in 1891 under the editorship of the Duc de Broglie.

TALLIEN (tȧ-lyăn), **Jean Lambert,** eminent revolutionist, born in Paris, France, in 1769; died there Nov. 16, 1820. He learned the

printer's art early in life, attaining to the position of overseer of the *Moniteur* in 1791, and the following year became an editorial writer of a Jacobin newspaper. Soon after he was made a deputy to the convention, where he supported Marat and voted for the execution of the king, and in 1793 became a member of the Committee of Public Safety. While serving as a member of that committee he visited a number of the western provinces of France to oppose the Girondists, and in that capacity caused many of his opponents to be guillotined. He was chosen president of the Convention on March 22, 1794, but there he was opposed and denounced by Robespierre and his name was finally stricken from the list of Jacobins. However, he maintained his influential position among leaders of France until 1798, when opposition forced him to leave the Council of Five Hundred. Subsequently he accompanied Napoleon to Egypt, but never again attained to prominence in public affairs, being dismissed by Talleyrand as consul to Alicante, and finally died in obscurity.

TALLOW (tăl'lō), the product obtained from rendering the fat of certain animals, especially that of cattle, goats, and sheep. It is a mixture of olein, palmitin, and stearin and is derived by submitting the fat to heat in kettles. The best grade of tallow is obtained from the fat found near the kidneys of cattle and grades of less value come from other parts, especially the caul, which covers more or less of the intestines. Pure tallow is somewhat whiter than lard, is almost tasteless, and has a peculiar odor. It is soluble in boiling alcohol and has a specific gravity of about .935. It is an important article of commerce and is used in making soap, candles, and lubricants. The better grade is employed in making oleomargarine. A vegetable tallow is obtained by boiling the berries of various plants, such as the tallow tree.

TALLOW TREE, a class of trees yielding vegetable tallow, a product of value in candle making. A number of widely different species have been described. They are distributed more or less in regions having a temperate climate. Most of them have large leaves and fragrant flowers and the stem measures from 25 to 50 feet in height. The vegetable tallow is secured by making incisions in the stem and by boiling the seeds, but the capsules and seeds of other species are the only parts that yield this product. These are boiled and crushed and the fatty substances are afterward secured by pressure. The *Chinese tallow tree* belongs to the spurge family and is cultivated extensively in China, India, and the warmer parts of America, especially in Georgia and the Carolinas. The *West African,* or *Sierre Leone, tallow tree* is of the gamboge family and both its seed and trunk yield a yellow, greasy juice. Copal is the product of the trunk and is used in making soap and varnishes.

TALMA (tål-mä'), **François Joseph,** tragedian, born in Paris, France, Jan. 15, 1763; died Oct. 19, 1826. He studied in London and Paris and first appeared upon the stage in 1787. At first he was not successful in winning favor, but he rose rapidly in the estimation of the public after 1789. For some time he was regarded the greatest tragedian of his period. He won the friendship of Napoleon, Danton, and other prominent men in France. His appearance on the stage was usually in a fancy costume, somewhat different than that of his time, and he powdered his face and head excessively. Later he adopted a correct costume. His greatest successes were made in Voltaire's "Mahomet" and Chenier's "Charles IX."

TALMAGE (tăl'măj), **Thomas DeWitt,** eminent divine, born in Bound Brook, N. J., Jan. 7, 1832; died April 12, 1902. He first studied law, later entered New Brunswick Theological Seminary, and in 1856 received a pastorate at Belleville, N. J. Subsequently he held an important charge in Philadelphia and in 1869 was called to a Presbyterian church in Brooklyn, where he attained remarkable success. The church building being burned in 1872, it was soon succeeded by a larger structure, which was likewise burned in 1889, and was replaced in 1891 by a magnificent edifice costing $400,000. A fire destroyed the last mentioned in 1894 and the following year he removed to Washington, D. C. Many of his sermons were published in the daily papers of America and Europe, and a number of his writings have been widely translated. The University of New York gave him a degree in 1862 and in 1884 he received a degree from the University of Tennessee. He visited Europe and the Holy Land in 1889. His writings include "From Manger to Throne," "Crumbs Swept Up," "One Thousand Gems," "The Marriage Ring," "Sports That Kill," "Sermons," and "Around the Tea-Table." He contributed to *The Advance, The Christian at Work,* and *Frank Leslie's Sunday Magazine.*

TALMUD (tăl'mŭd), the name sometimes used to designate all the teaching of the Jewish law. In this sense the term comprises the Mishna, the Gemara, and the writings commonly called the Old Testament, but it is employed more frequently to describe the body of Jewish civil and canonical law not comprised in the Pentateuch, commonly including the Mishna and the Gemara, but sometimes limited to the latter. The Mishna is properly the first part of the Talmud and consists of a collection of traditions and decisions made by Rabbi Juda, which he compiled about the year 192 A. D. to sum up all previous rabbinical labors. On the other hand, the Gemara is the second part of the Talmud and embraces an exposition of the first part. The Mishna was written in Hebrew and the Gemara in Aramaic. The greater part of these works is devoted to religion and ethics,

but they contain more or less of writings that may be classed as history, philosophy, and sciences. Jews generally hold the Talmud of greater importance than the Old Testament, but it is looked upon by Christians as being a fund of information regarding later developments in Judaism and as containing numerous exaggerations. The Talmud was first preserved in traditional forms and fragmentary writings, which were afterward collected into written volumes. Two collections are extant, known as the *Jerusalem Talmud* and the *Babylonian Talmud*. The former embodies the discussions on the Mishna of the Palestine doctors from the 2d to the middle of the 5th century and the latter, those of the Jewish doctors in Babylonia from about 190 to the 7th century. These works are written with the subject-matter in the center of the page and around the margins are notes and comments.

TAMAQUA (tȧ-mą'kwȧ), a borough of Pennsylvania, in Schuylkill County, 37 miles north of Reading, on the Little Schuylkill River. It is on the Philadelphia and Reading and the Central of New Jersey railroads. In the vicinity are extensive coal mines. It has a public library and a number of fine schools. The manufactures include hardware, flour, boots and shoes, knit goods, and clothing. It has electric lighting, waterworks, and sewerage. The vicinity was settled in 1799 and Tamaqua was chartered as a borough in 1852. Population, 1920, 12,353.

TAMARIND (tăm'ȧ-rĭnd), a tropical tree of the bean family, which was originally native to the East Indies, but is now extensively naturalized and cultivated in other warm regions. About forty species have been described, ranging from shrubs to large trees, but the common tamarind usually ranges in height from thirty to forty feet. The leaves are alternate and pinnate, the flowers are reddish-yellow, and the fruit consists of a brown-shelled pod from three to six inches long, containing three to ten seeds. The seeds are used in making a beverage, in cookery, for preserving fish, and for various purposes in medicine. Pressed in syrup or sugar, the pods form the preserved tamarind of commerce. The wood, bark, leaves, and flowers have economic value, and the tree forms a fine ornamental plant. Species native to the East Indies frequently reach a height of eighty feet, and their pods contain more seeds than those raised in the West Indies. Other species are met with in the deserts of Asia and Africa, but these are invariably smaller plants.

COMMON TAMARIND.

TAMARISK (tăm'ȧ-rĭsk), the name of several shrubs and herbs native to Europe, found chiefly in the region of the Mediterranean. The *common tamarisk* cultivated in gardens grows wild in Southern Europe. It is a fine shrub from twelve to fifteen feet high and has light green leaves and beautiful flowers. When in full blossom, it is one of the most beautiful shrubs, presenting a profusion of small red flowers. Another species, the *German tamarisk,* grows to a height of eight feet. The branches are upright and the bark is smooth, but the flowers are very beautiful. These plants are popular for ornaments in gardens and parks. Some species of tamarisk attain a height of thirty feet and are used as fuel, such as are common to the deserts of Arabia and Africa.

TAMBOURINE (tăm-bo͝or-ēn'), an ancient musical instrument of the drum class, consisting of a wooden hoop, one side of which is open and the other is covered with a vellum head. Around the hoop are metal plates, which jingle when the instrument is played. The player strikes the head with the fingers, hand, or elbow, thereby producing a rolling sound, and intensifies the musical effect by drawing the fingers or thumb over the skin. Tambourines are popular among the Italians, Gypsies, and Basques and are used extensively in various parts of America and Europe. A form of these instruments is employed with good effect by the Salvation Army, usually in connection with a drum and cornet.

TAMERLANE (tăm-ẽr-lān'). See **Timur.**

TAMIL (tä'mĭl), a race of people native to Ceylon and southern India. They are classed with the Dravidian peoples of India. It is supposed that they inhabited the country before it was invaded from the north by the Aryans, whose culture they adopted. Their language is spoken in the northern part of Ceylon and a large part of India. They have an important and extensive literature and many of the writings are in verse.

TAMMANY SOCIETY, a political organization of the Democratic party in New York City, which has long wielded marked influence in the municipal and State elections. The first organization, founded in 1789 by William Mooney, was known as the Columbian Club, but in 1805 the society incorporated under its present name, which was derived from an Indian chief of the Delaware tribe. Aaron Burr in 1800 placed the society on such a thoroughly organized footing that it controlled New York City politics and gave him the Vice Presidency. The first building was erected by the society in 1811, and in 1822 the power of the organization was merged into its general committee. Consecutive growth increased the committee to 1,400, and the chairman finally developed into a boss of the hall. William M. Tweed was the most noted of the bosses, but his corruption was finally exposed and he was imprisoned in 1871, dying in jail with a suit pending against him which the city had brought for the recovery of $6,000,000.

Though crippled for some time, it soon reorganized and is now the most potent influence in the city politics of Greater New York. The society supported Garfield for President in 1880 and thereby defeated Hancock, but its opposition to Cleveland in 1884 did not secure the vote of New York to Blaine. More or less friction between the society and Democrats of New York outside the city has weakened the party to some extent in the State. In 1896 the Tammany Society opposed the candidacy of Bryan, but it supported him in 1900 and in 1908. Richard Croker, Charles F. Murphy, John Kelly, and Thomas L. Leitner are among its most prominent leaders. At present the membership is 750.

TAMPA (tăm'pȧ), a city in Florida, county seat of Hillsboro County, on Tampa Bay, at the mouth of the Hillsboro River. It is on the Seaboard Air Line and the Atlantic Coast Line railroads. The place has a fine harbor and has steamboat connections with Havana, New York, Charleston, and other American ports. Among the noteworthy buildings are the county courthouse, the public library, the Convent of the Holy Names, the Tampa Bay Hotel, the Citrus Exchange, the Hillsboro Hotel, and many fine churches. It is noted both as a summer and a winter resort.

Tampa has large interests in the manufacture of tobacco, cigars, clothing, earthenware, machinery, and canned goods. Other important industries include fishing and wholesaling. It has a considerable export and import trade. The city has electric lighting, street railways, waterworks, sewerage, paved streets, and many fine public grounds, including Plant Park. It was settled in 1848 and incorporated in 1886. Population, 1905, 22,823; in 1925, 94,743.

TAMPA BAY, an extensive inlet from the Gulf of Mexico, on the west coast of Florida. It is 38 miles long and from six to fifteen miles wide. The northern part is divided into Old Tampa Bay and Hillsboro Bay. Within the bay are numerous small islands, and at its entrance, on Egmont Key, is a lighthouse. Marketable fish and turtles abound in the bay, and it is important as a spacious and safe harbor. Tampa, on its northern shore, is the chief port.

TAMPICO (tȧm-pē'kō), a seaport city of Mexico, in the state of Tamaulipas, about 225 miles northeast of the city of Mexico. It is situated near the mouth of the Panuco River, about five miles from the Gulf of Mexico, and has convenient railroad connections with the interior. The harbor is made unsafe by sand bars, but jetties enable vessels drawing 24 feet of water to enter. It has two hospitals, a customhouse, and several schools and churches. The city has broad and regular streets, but is rather unhealthful on account of its site being low and swampy. Sewerage, telephones, and electric lighting are among the facilities. It has exports of tallow, hides, salted meat, and fish. Population, 1922, 27,168.

TANA (tä'nȧ), a river of British East Africa, which rises in the southwestern slope of Mount Kenia and discharges into the Indian Ocean. In the upper course it has many falls and cataracts, but the lower part passes through alluvial plains. A bar obstructs it at the entrance, but it is navigated about 350 miles during the rainy season. The entire length is 500 miles.

TANAGER (tăn'ȧ-jĕr), a family of passerine birds belonging to the finch family. They are native to the warmer regions of America. The species number fully 300, most of which are noted for their brilliant plumage and fine colors. The hues include mainly beautiful shades of orange, scarlet, and black. A large number of the species are birds of fine song, particularly the *organist tanager,* a bird found largely in Central America. Some of the species visit the warmer parts of the United States, frequenting places as far north as Massachusetts. They are quite shy and cautious, and their nests are built in places safely isolated from dwellings. A species known as the *summer redbird* is about seven inches long and has an alar extent of twelve inches. The *festive tanager* has a parrot-green plumage.

TANANARIVO. See **Antananarivo.**

TANCRED (tăn'kred), eminent Italian prince, born in Sicily in 1078; died in Antioch in 1112. He was the son of the Marquis Odo the Good and of Emma, sister of Robert Guiscard, and became distinguished as a leader of the first Crusade to the Holy Land. His services were distinguished particularly at the siege of Nicaea in 1097, at the Battle of Dorylaeum in the same year, and at the capture of Jerusalem in 1099. He was a claimant to the throne of Jerusalem, but when that honor fell to Godfrey de Bouillon he was made Prince of Galilee. Subsequently he defended with great valor the Christian cause against the Mohammedans and infidels, especially at Antioch and on his campaign to various parts of Asia Minor. He not only carried the contest to Tripoli, but expelled the Saracens from Syria, and settled several quarrels among the Christian princes in Palestine. Tasso represents him as the flower of chivalry in his famous poem, "Jerusalem Delivered."

TANERA (tȧ-nā'rȧ), **Karl,** novelist and military writer, born at Landshut, Germany, July 9, 1849; died in 1904. After a careful military training he joined the army of Bavaria and saw active service in the War of 1866 and the Franco-German War of 1870 and 1871. He was made an attaché of the department of military history in 1882, but retired in 1887 to devote his attention to literary work, having attained the rank of captain. In 1891 he completed his "War of 1870-71," which comprises one of the most valuable historical works of the war between France and Germany. His "Wars of Germany from Fehrbellin to Königgrätz" was completed in 1894. He is perhaps better known by his novels and publications relating to travels in Africa,

some of which have been widely translated. These works include "Recollections of an Ordnance Officer," "Sketches from Three Grand Divisions," "Germany's Campaigns in East Asia," "Life of Officers in War and Peace," "Severe Campaigns," and "Tour of the World."

TANEY (tā'nĭ), **Roger Brooke,** eminent jurist, born in Calvert County, Maryland, March 17, 1777; died Oct. 12, 1864. His father was a Roman Catholic planter in Maryland, where the family settled shortly after coming from England. He graduated from Dickinson College in 1795, and four years later became a member of the Maryland bar. In 1799 he was elected a member of the house of delegates, served in the State senate from 1816 until 1821, and two years later began a successful law practice in Baltimore. President Jackson appointed him Attorney-General of the United States in 1831, in whose Cabinet he was a trusted and valuable adviser. He was made Secretary of the Treasury in 1833, and in that capacity supported Jackson in removing the deposits from the United States Bank to local banks, but the Senate would not confirm his appointment, though the deposits had already been taken from the bank. The President nominated him in 1835 to succeed Chief Justice Marshall on the supreme bench, and the appointment was confirmed the following year. The official service of Chief Justice Taney was marked by many important events, particularly concerning the question of State sovereignty and the extension of slavery. His decision in the Dred Scott case is the most celebrated, and involved the question whether a slave owner could remove into free territory and still retain title to his slaves.

This celebrated decision was the occasion of much discussion. Dred Scott had been carried by his master from Missouri, a slave State, into Illinois, a free State, and accordingly claimed his freedom, but Chief Justice Taney held such removal did not constitute liberation. Much excitement followed the application of this decision, since it set aside the Missouri Compromise and allowed the extension of slavery to the territories. It was commonly reported that Taney made the statement, "A slave has no rights which a white man is bound to respect," but it was proven later that he never employed the language imputed to him. That he did not use language of this kind is shown by his own conduct, since he liberated all the slaves inherited from his father's estate. The law opinions of Taney are contained in the "Supreme Court Reports," and his "Memoir" was published some time after his death.

TANGANYIKA (tăn-găn-yē'kä), one of the great lakes of tropical Africa, situated between German East Africa and the Congo Free State. It stretches in a direction from southeast to northwest, has a length of 415 miles and an average width of 30 miles, and its surface is 2,700 feet above sea level. The basin is a deep depression between hills and mountains, though the western coast is somewhat the higher, and the eastern portion is partly in the Great Rift Valley. Numerous rivers flow into it, but they are not large streams. The outlet is by the Lukuga River into the Congo. Speke and Burton discovered this lake, in 1858 and extensive explorations were made soon after in its vicinity. In ordinarily dry seasons the evaporation equals the inflow, when the Lukuga ceases to discharge, but in the wet period there is a considerable outflow. Vast and valuable forests abound in the vicinity of the lake, and on its eastern shore is the town of Ujiji, the most important in that region. Other towns include Albertville and Bismarckburg.

TANGIER (tăn-jēr'), or **Tangiers,** a seaport city of Morocco, near the western entrance of the Strait of Gibraltar, about 10 miles east of Cape Spartel. It occupies a fine site on the Bay of Tangier, overlooking the strait, and is defended by walls and several forts. The noteworthy buildings include the Great Mosque, the Roman Catholic church, the provincial government houses, and the buildings occupied by the foreign ministers and consuls to the Morocco court, all of whom have their residence at Tangier. The streets are in a poor condition, mostly narrow and dirty, but there is a considerable foreign and interior trade, particularly in live stock, minerals, clothing, utensils, and raw materials. Tangier is the ancient Tangis and was founded by the Carthaginians, but later became a Roman possession. Charles II. of England received it as the dowry of the Infanta of Portugal in 1662, but the expense of maintaining the government caused its abandonment in 1684. It was besieged and bombarded by the French in 1844. The inhabitants consist mostly of Mohammedans, but include 6,000 Christians and 7,000 Jews. Population, 1922, 35,650.

TANJORE (tăn-jōr'), an inland city of India, capital of a government of the same name, 175 miles southwest of Madras. It is located in the midst of an extensive plain, about 45 miles west of the Bay of Bengal, and has considerable railroad and trade advantages. Among the notable buildings are the great pagoda, a beautiful Hindu temple, and the palace of the rajah. It is the seat of a number of mosques, churches, public offices, and educational institutions. The manufactures include earthenware, silk textiles, cotton and woolen goods, and machinery. It has a considerable trade in cereals, live stock, and fruits. In 1773 the British laid siege to the town and soon after annexed it to their colonial possessions. Electric and gas lighting, telephones, pavements, and waterworks are among the improvements. Population, 1922, 58,780.

TANNHÄUSER (tăn'hoi-zĕr), or **Tanhauser,** the subject of a favorite German legend, of the Middle Ages, who is represented as a knight traveling to become acquainted with the beauties and wonders of the world. It is related

that upon reaching the city of Venusburg, he entered the cave palace of Lady Venus, and that he lived at her court in great pleasure until he became conscience smitten. The voice of Virgin Mary commanded that he make a pilgrimage to Rome to invoke remission of his sins by Pope Urban, but his sins were of such a magnitude that the Pope declared it quite as impossible to absolve them as for the wand he carried in his hand to again assume life and bear buds and leaves. The knight returned in dire despair to Venusburg, but the Pope soon after found that his wand actually sprouted and began to grow. This was taken by the Pope as a sign from God that the knight still had an opportunity for salvation, and accordingly sent messengers to all lands in search of him, but the lost knight could be found nowhere. Richard Wagner based his opera "Tannhäuser" on this legend, and Tieck and other poets treated it in song and sonnets. Many primitive people have similar legends, in which subterranean palaces of kings and queens are described minutely. The visit of Ulysses to the Isle of Calypso is a noted example.

TANNIN (tăn'nĭn), or **Tannic Acid,** the name applied to certain astringent substances occurring in the bark and other parts of plants. They are widely distributed in various forms throughout the vegetable kingdom. These substances possess the property of coagulating albumen and gelatin and forming dark-colored precipitates with salts of iron. They occur in large quantities in oak bark and to a lesser extent in that of hemlock, willow, elm, pine, and chestnut. Tannin is derived from the bark of the plum, pear, and other fruit trees. Forms of tannin occur in the bark of the sumac and the whortleberry. It is found in the leaves of the ash-tree and several allied plants. Coffee, tea, and other substances contain a certain per cent. of tannin. It has many important uses in the arts and trades, particularly for tanning or converting the skins of animals into leather. This operation depends on the formation in the skin of an insoluble compound of tannin and the albuminoid matter of the skin. The tannin employed mostly is derived from oak and cinchona bark, which is ground to a coarse powder and piled in alternate layers with the skins in deep vats. The vats are then filled with water and the skins are allowed to soak for a few weeks or months, until they have become penetrated by the tannin.

TANNING. See **Leather.**

TANREC (tăn'rĕk), or **Tenrec,** the name of a genus of mammals found in Madagascar. They are insect-eating animals and somewhat resemble the hedgehogs. The hairs are spiny, and the young have actual spines, but these are shed when the permanent teeth develop, to be replaced with spiny bristles about an inch long. These animals are nocturnal, coming out at night to search for food. Although they appear to prefer insects, they feed partly on worms and the tender roots of plants. Some species are molelike and do damage by burrowing in the rice fields.

TANSY (tăn'zy), a coarse perennial plant of the composite family. It is native to Europe and Asia, but has been naturalized in North America, where it grows as a common weed along the roadside. It attains a height of two to three feet, bearing finely dissected leaves and rayless heads of yellow flowers. All parts of the plants are strongly aromatic and bitter, which circumstance has led to their medicinal and culinary use.

TANSY.

The *oil of tansy* is highly poisonous. Under medical advice it may be taken as a remedy in dropsy and as a worm-destroying agent.

TANTALUS (tăn'tà-lŭs), in Greek legend, a wise and wealthy king of Lydia, with whom the gods associated. On several occasions he was permitted to sit at a table with Zeus, who listened with interest to his wisdom and delightful conversation. Later he lost these distinguished marks of divine favor by stealing nectar and ambrosia from the table of the gods, with which he regaled his friends. Later he killed his own son, Pelops, and served him at one of the banquets to the gods. Zeus condemned him for these offenses to eternal punishment in the Lake Tartarus and afflicted him with an eternal thirst. As Tantalus stooped to drink of its waters, they receded from his parched lips, and the tall trees overhanging the shore with beautiful fruit withdrew as he attempted to grasp their delicacies that hung over his head. Not only was he continually taunted, but a great rock forever threatened to fall upon and crush him. The word *tantalize* was derived from the subject of this myth.

TANTRA (tăn'trà), the name of a Sanskrit book that treats of a religious ceremony, relating chiefly to the worship of Siva, or of Sakti, the female principle. Several works of this class of literature are extant. As a whole they deal with the creation and the destruction of the world, lay down a ceremonial form for the worship of the gods, and contain prayers and rituals. One of the leading Hindoo commentators mentions not less than 65 Tantras. Collectively they are considered as a fifth Veda, though they are much more recent, all dating subsequent to the

Christian era. The followers of the Tantras, called the *Tantrikas,* worship by means of mystical rites.

TAOISM (tā'ŏ-ĭz'm), a form of religious worship in China, based upon the teachings of Lao-tse, a scholar of the 6th century B. C. The religion probably existed from prehistoric times, but no authentic information regarding it can be traced further back than the time of Lao-tse, an official who appears to have given it definite form and made it popular. He published a small work under the title "Classic of the Way and of Virtue," which teaches a form of religion something similar to naturalism or rationalism. Gentleness, humility, economy, and the return of goodness for evil are among the principal requirements. The priests of Taoism practice a form of mysticism, determine lucky and unlucky days, and regulate popular feasts. They admonish their followers to cultivate the simplicity and innocence of former days and practice divination by the use of a system of broken and unbroken lines, which they determine with the so-called *Shih* sticks. Formerly Taoism was a mere system of superstitions and fanciful notions, but it developed into a religion through the adoption of certain peculiarities common to the Buddhist faith. Many monasteries and temples devoted to Taoism are found in China and a few are met with in other countries of Asia, especially in Anam and Japan.

TAPAJOS (tä-pä-zhŏsh'), a river in Brazil, which rises by two branches near the boundary of Bolivia, and, after a course of 1,100 miles toward the northeast, joins the Amazon near Santarem. It is formed by the junction of the Arinos and Juruena rivers, and a short distance below the junction are a number of important falls, some of them twenty to thirty feet. The greater part of the main channel is navigable, and in its lower course is a lakelike expansion, which in some places widens to twelve miles. The Arinos River has its source only eighteen miles from the Paraguay, both rivers rising in a diamond-producing district. The valley is highly fertile and contains fine forests.

TAPESTRY (tăp'ĕs-trў), a kind of ornamental figured cloth of wool or silk. Usually the figures are raised above the surface and enriched with gold and silver, the designs representing men, animals, historical subjects, or landscapes. The term was originally applied to ornamental hangings, which were adjusted in dwellings to hide the walls, or to form screens or curtains. The term tapestry is employed at present not only to describe hangings, but also coverings of furniture of churches and apartments of public offices. Hand tapestry is embroidered by the needle, woolen or silk threads being worked into the meshes of a fabric. The different colored designs are made by working short lengths of thread at the proper places and fastening them at the back of the textile.

In many European countries beautiful tapestry was made for adornments in monasteries and churches by noble ladies, who engaged in the art largely for the sake of occupation and benevolence. The loom began to be introduced for making tapestry in the 9th century, after which much of the work was done by machinery, although the rare and beautiful designs are still hand-made. Tapestry of Flemish manufacture in the 14th and 15th centuries took very high rank, which gave rise to the large enterprises devoted to its production at Bruges, Antwerp, Brussels, and other cities. The art was not introduced in England until in the reign of Henry VIII., but there were manufactures of considerable importance in France, Germany, and other continental countries long before. France was celebrated for the productions of tapestry in the time of Louis XIV., when the celebrated Gobelin's factory flourished in Paris. A variety of woven fabrics having a multiplicity of colors in their design are commonly called tapestry, but they do not properly belong to that class of woven fabrics. Tapestry carpet belongs to this class. See **Bayeaux Tapestry.**

TAPEWORM, the common name of a class of parasitic worms infesting the alimentary canal of vertebrates. They have no mouth or alimentary canal, but live by absorbing the juices of the animals they infest. The length varies from five to fifteen yards, and the typical species are ribbonlike, varying in breadth from two lines at the narrowest part to five at the broader end. At the narrow end is the head, which is supplied with suckers or hooks for adhesion, and a row of segments constricted off from it increase progressively in size toward the posterior. The larger tapeworms have several hundred segments, each budded off from the head, the oldest being farthest from it. Each segment matures male and female organs, and, when it is developed, breaks off and is expelled from the bowels. To develop a new tapeworm, it is necessary that the matured segment be swallowed by some warm-blooded vertebrate. This may occur by drinking water or eating flesh of the swine or other animals.

When the buds are swallowed, the fertilized ova develop into hooked embryos, which bore through the alimentary canal into the tissues, or into the blood vessels, and pass from the latter with the blood to the brain, liver, or other organs of the body, where they surround themselves with cysts containing a fluid and become bladder worms. The head is developed from the bladder worm, but is not capable of further development until it is swallowed by the proper host. Different species of tapeworms are found in the muscles of the ox, in the brain of sheep, and in the muscles of hogs. The *broad* or *Swiss tapeworm* inhabits certain fish, as the pike and turbot. In some cases persons infested by a tapeworm experience no inconvenience, but usually there is pain in the stomach, continual crav-

ing for food, faintness, and restlessness, and itching in various parts of the body.

TAPIOCA (tăp-ĭ-ō′kȧ), a nutritious, starchy food derived from the large, tuberous roots of the cassava or manioc plant. The juice is obtained by pressing the roots and allowing the starch to deposit at the bottom of a vessel. *Cassava starch* being thus separated from the fibrous constituents, it is spread upon iron plates while in a moist condition and, under the application of the heat, the starch granules become partly ruptured and agglomerate into irregular pellets. In this condition the starch forms the tapioca of commerce and is employed largely in making puddings and as light, nutritious food for invalids. The portion of the root remaining after the starch has been extracted is ground to a pulp and used in warm countries to make manioc or cassava bread, which is eaten largely by natives and the poorer whites. Tapioca is manufactured in large quantities in the West Indies, Brazil, and the East Indies, where different species of the cassava plant are grown. Some species yield tubers weighing twenty to thirty pounds.

TAPIR (tā′pĕr), a class of hoofed quadrupeds, which have a bulky body and moderately long legs. In appearance they somewhat resemble the hog, but the legs are longer and the nose is not fitted for digging in the soil. The snout is prolonged into a proboscis. The skin is thick and covered with short but close hairs, the tail is short, the ears are small, and the neck is clothed with a short, stiff mane. Tapirs have four toes on the fore feet and three on the hind ones. They are found in large numbers in South America, ranging from the Isthmus of Darien to the Strait of Magellan. The color of the South American tapir is brown, and the size is about that of a small ass. The flesh is eaten by natives, the meat being considered quite nutritious. When pursued by the jaguar, it rushes to the water and finds safety in diving. The tapirs of Malaysia and Sumatra are larger than those of South America, the body being seven to nine feet long. They are easily tamed and domesticated, when they become quite gentle. Living representatives are not found in Europe, but fossil remains are very abundant, some of them approximating the elephant in size.

AMERICAN TAPIR.

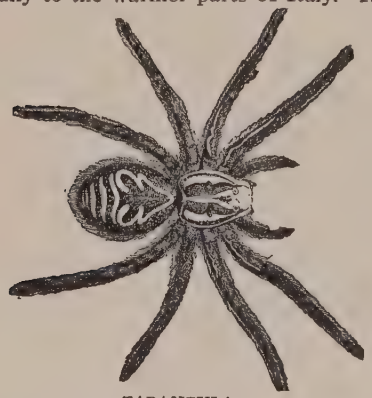
TAR, an oily liquid secured by the destructive distillation of organic substances, such as coal, wood, shale, and peat. The two principal classes sold in the market are *wood tar* and *coal tar.* The former is the product of the special distillation of several varieties of wood, and the latter is a primary by-product of the distillation of coal for the manufacture of illuminating gas. Large quantities of tar are made in the forests of North Carolina, and to a greater or less extent in a number of other states. The usual plan is to excavate a shallow hole near the upper side of an embankment of a hill, into which the wood is piled in conical heaps, after being cut into sticks about three or four feet long and several inches thick. It is then covered with damp soil and fired, the tar being melted out of the wood while it burns slowly, and is collected in a large cast-iron can below, from which it is conducted through spouts into barrels. It requires two or three weeks to complete the burning of a large kiln, and 15 to 18 per cent. of the wood is converted into tar. Pitch pine and fir trees are used extensively in tar making, but the better trees are used in manufacturing turpentine, while the older and inferior classes are picked for tar making. Sweden produces large quantities of wood tar, in which country the trees are partly stripped of their bark several years before they are cut down, this serving to increase the quantity of resinous matter.

The chemical constituents of tar include acid, alkaline, and neutral substances. It is used chiefly for coating the planks and cordage of ships, in making tar paper, in constructing tar pavements and tar roofs, for protecting iron work from the weather, and for making valuable disinfecting compounds, such as creosol and carbolic acid. Coal or mineral tar was first manufactured in the latter part of the 18th century, though only to a limited extent, but when

coal gas came largely into use it became greatly cheapened and entered more extensively as a merchantable product into the market. The tar resulting in the manufacture of gas was first produced in such large quantities that it could not be disposed of successfully, but since then it has entered largely into the industries as a fuel and for producing hydrocarbon oils, pitch, and analine colors.

TARANTO (tä'rän-tō), a city in the southern part of Italy, at the northern end of the Gulf of Taranto, 45 miles southwest of Brindisi. It is situated on an island, which was formerly a peninsula, and is separated from the Gulf of Taranto by the Little Sea. The harbor is one of the best in Italy and admits the largest vessels. It has railway facilities, well-paved streets, electric lighting, and electric street railways. The principal buildings include the Cathedral of Saint Cataldo, an episcopal palace, the castle, and the public library. Among the chief manufactures are cotton and linen goods, macaroni, canned and cured fish and oysters, and olive oil. The city was founded by the Greeks about 707 B. C. and was anciently known as Tarentum. It became the leading Greek city in Italy and remained independent until 272 B. C., when it was captured by the Romans. Hannibal took possession of it in the Second Punic War, but it was later retaken by the Romans. Few relics from ancient times are extant. Those remaining are principally traces of several temples and an amphitheater. Population, 1922, 61,327.

TARANTULA (tà-răn'tū-là), or **Tarentula,** a species of spider native to Southern Europe, especially to the warmer parts of Italy. It is so



TARANTULA.

named from Taranto, Italy, where tarantulas occur in considerable numbers. The body is elongated, being a little more than an inch in length, and the color is brownish. This spider belongs to the hunting class and displays remarkable ingenuity in running down its prey. The bite was formerly thought to produce the disease called *tarantism,* but it is now known to be no more dangerous than that of a common wasp. A class of hairy spiders, known as tarantulas, are native to Texas and other Southern States. The body is large and the bite is quite poisonous. A species known as *digger wasp* is an allied form and is peculiar for making deep holes in the ground, which it lines with silk and covers with webs. The females are peculiar for carrying their young on the back.

TARAPACÁ (tä-rà-pà-kä'), a province in northern Chile, which is of vast importance because of its extensive deposits of saltpeter. The area is 19,306 square miles. Iquique is the capital and principal seaport. A railroad line extends from the capital to the saltpeter deposits twenty miles inland. Vast reducing works are maintained at various points, largely by foreign capitalists, and the annual export of this commodity is valued at $27,500,000. The soil of Tarapacá is dry and barren and a mountain range trends nearly parallel to the coast, in which rich deposits of silver are worked. Nearly all the inhabitants are dependent upon the saltpeter and silver mining industries. Formerly the region belonged to Peru, but it was ceded to Chile in 1884. Population, 1922, 92,985.

TARBELL (tär'bĕl), **Ida Minerva,** author, born in Erie County, Pennsylvania, Nov. 5, 1857. She studied in the high school at Titusville and at Allegheny College, and for some years was assistant editor of *The Chautauquan.* In 1891 she entered the Sorbonne, in Paris, as a student, and subsequently studied at the College de France. After returning to the United States, she became associate editor of *McClure's Magazine.* Her books include "Early Life of Abraham Lincoln," "Short Life of Napoleon," "History of the Standard Oil Company," "Life of Abraham Lincoln," and "Life of Madame Roland."

TARE, the name of several species of plants native to the Northern Hemisphere. They belong to the pea family and are known as *vetch* in some localities. The root is annual, the leaves are oblong, and the climbing stem grows to a height of three feet. The flowers are usually in pairs, either red or purplish, and the seeds are nutritious. Several species are grown extensively in Europe as feed for cattle and horses. They thrive best in a rich sandy soil, but are frequently sown for green manure in tracts that need fertilizing. Mention is made of the tare in Matt. xiii, 36, but it is supposed to refer to the darnel.

TARENTUM (tà-rĕn'tŭm), a borough of Pennsylvania, in Allegheny County, 20 miles northeast of Pittsburg. It is on the Allegheny River and the Pennsylvania Railroad and is surrounded by an agricultural region. Among the features are the public library, the high school, and several fine churches. The manufactures include plate glass, bottles, paper, flour, and machinery. Electric lighting, waterworks, and sewerage are among the public utilities. Population, 1900, 5,472; in 1920, 8,925.

TARGET (tär'gĕt), a mark or butt set up to be shot at, as to test the accuracy of a firearm

or the force of a projectile. It is usually made of steel in a circular form and in the center is the bull's eye, around which are two or more wide rings. In target practice it is customary to cover all portions of the target, except the bull's eye, with a white or light blue paint. This enables the marksman to distinguish in taking aim at the bull's eye, which, when struck, causes a figure to spring up at the top. If the center is missed, the ball or other projectile causes a mark in the newly applied paint, hence the best marksmanship can be determined easily. Target practice is usually at distances of from 100 to 300 yards, but a sharpshooter usually practices at 500 yards. All kinds of small arms are used in practicing, but army practice is chiefly with the carbine, rifle, or revolver.

TARGUM (tär'gŭm), the name applied to one of several Chaldee versions of the Old Testament. These translations became necessary when the Hebrew language was superseded by the Chaldee, or Aramaic, tongue, in the general vocabulary of Palestine. Although they are not of great value for the criticism of the text, these writings are helpful in that they furnish means to study the life and custom of the people at the time they were written. Among the Targums extant are those of the Prophets, Job, Ruth, Esther, Lamentations, Song of Songs, Ecclesiastes, Proverbs, and Psalms. There are in fact three Targums to Esther and three to the Pentateuch.

TARIFA (tä-rē'fä), a seaport city of Spain, in the province of Cadiz, on the Strait of Gibraltar. It occupies an imposing site 25 miles southeast of Cape Trafalgar, where it was founded in 710 A. D. by an Arab chief named Tarif ibn Malek. The Moors required all vessels passing through the Strait of Gibraltar to pay duties at Tarifa, and the duties were called *tarifas,* whence came the English word *tariffs.* A force of Spaniards from Castile captured Tarifa in 1292, and the French took possession of it in 1823. Population, 1922, 13,168.

TARIFF (tăr'ĭf), a list or schedule of duties to be paid to the government for the importation or exportation of articles of merchandise. The list is usually in alphabetical order and the rates are subject to frequent changes, owing to the circumstance that duties depend on the supply and demand of goods and on the interest and wants of the community. Tariffs may be *prohibitory* or *retaliatory,* and may be charged *specifically* or *ad valorem.* The tariff rates may be settled by government authority or by agreement between different nations. In the United States tariffs are levied only on imports for revenue and protection, but many articles are on the free list. Both export and import duties were charged in the colony of New Netherlands as early as 1629, and the Massachusetts Bay colony levied import taxes in 1668. An unsuccessful effort was made by the Continental Congress to unite the colonies on a general tariff tax law.

CANADA. The present tariff law of Canada was enacted in 1907, when the former Customs Act of 1897 was repealed. It provides for three rates of duties, known as the general tariff, the intermediate tariff, and the British preferential tariff. In addition to these it provides a surtax and a special, or dumping, duty. The *general tariff* applies to all articles which are not admissible under either the intermediate or the British preferential tariffs. The *intermediate tariff* applies to all goods that the Governor General may by Order in Council designate. However, no country is at present entitled to this class of rates. The *British preferential tariff* applies to all goods that are produced or manufactured in the United Kingdom and certain British countries that may be admitted to the benefits of the same. A *surtax* is levied upon the imports from countries that do not treat imports from Canada as favorably as those from other countries. The *special,* or *dumping, duty* is levied on goods which are sold to consumers in Canada at a lower price than the fair market value.

UNITED STATES. President Washington signed the first tariff act passed by the United States on July 4, 1789. It was prepared by Alexander Hamilton and provided duties ranging from 5 to 15 per cent., though only 47 articles were specially enumerated. The purpose of this tariff was to provide revenue for the general government, both for its support and to discharge the national debt. It provided duties averaging 8 per cent. ad valorem, but the duties were raised to 11 per cent. in 1790 and to 13 per cent. in 1792. Refined sugar and tobacco were placed on the tariff list in 1794, and another extension of the list was made in 1797. Hamilton and the Federalists advocated, largely for political reasons, the adjustment of the tariff so as to give protection to American industries. This theory went into effect in the form of the Lowndes-Calhoun bill of 1816, which imposed duties of about 25 per cent. on leading manufactures, but the agricultural South and commercial New England protested against it. In 1824 a new tariff bill was passed, which provided an average rate of 37 per cent. and increased the duties on metals and agricultural products. This measure was championed by Henry Clay, who made himself the leader of the so-called *American system,* which aimed to combine a high protective tariff with Federal expenditures for internal improvement.

The so-called *tariff of abominations,* imposing duties on raw materials, was passed in 1828, and provided a rate of 41 per cent. Calhoun and South Carolina remonstrated against this measure, owing to the fact that some of the duties were prohibitive, and they were supported and aided in the protest by Alabama, Georgia, and North Carolina. It was claimed by the opponents of the measure that Congress had no right to levy tariff duties for protection, urging not only the injustice of a high tariff from which

exporting states received no benefit, but also its general unconstitutionality. In 1832 the tariff laws were modeled after those of 1824, but they still retained the principle of protection, and South Carolina immediately proceeded to nullify the act. Jackson met nullification with marked decision, but Henry Clay introduced the Compromise Bill of 1833, which provided for a gradual reduction of tariffs to a uniform rate to be reached in 1842. The Polk-Walker tariff of 1842, so called from Robert J. Walker, Secretary of the Treasury under President Polk, changed all existing rates but was a protective measure. In 1846 a new tariff was enacted, which provided a so-called *tariff for revenue only,* though it retained protective features. The tariff of 1857 made a further reduction of duties and remained in force until 1861.

The Morrill tariff went into effect on April 1, 1861, and practically doubled existing duties. Immediately after the Civil War enlarged the necessary expenditures of the government, which were met by several successive bills raising the tariff. A modification of rates was made in 1870, when tea, coffee, and several other articles were added to the free list. Quinine was added to the free list in 1879 and shortly after a reduction was made in the duty on pig iron, wool, steel rails, paper, and glass. The McKinley tariff of 1890 enlarged the free list, but increased the duties on many commodities and provided a bounty of two cents per pound on sugar in lieu of duty. Some articles were taxed so high that importation was practically prohibited. The Wilson tariff of 1894 reduced the duties about 38 per cent. and enlarged the free list considerably. It carried with it a tax of 2 per cent. on the excess above $4,000 per annum of all incomes, but the Supreme Court declared this feature unconstitutional. The Wilson tariff was repealed in 1897, when the Dingley tariff took its place. In 1909 the Dingley tariff was succeeded by the Payne-Aldrich tariff. This tariff measure was repealed in 1913, when the Underwood tariff law was enacted, which reduced taxation considerably and enlarged the free list. It remained in force until 1922, when the Fordney-McCumber Act took its place.

TARKINGTON, Newton Booth, novelist, born in Indianapolis, Ind., July 29, 1869. He studied at Princeton University, where he graduated in 1893. He was elected to the State Legislature in 1902 and the same year married Laurel Louisa Fletcher. His writings are artistic and have attracted considerable attention. Among his chief works are "The Gentleman from Indiana," "Monsieur Beaucaire," "The Two Vanrevels," "In the Arena," "The Conquest of Canaan," "The Beautiful Lady," "His Own People," "Beasley's Christmas Party," and "The Midlander."

TARLETON (tärl'tŭn), **Sir Banastre,** soldier, born in Liverpool, England, Aug. 21, 1754; died Jan. 23, 1833. He began the study of law, but entered the army at the beginning of the war for independence in America. In 1776 he operated with Clinton against Fort Moultrie and the following year accompanied Cornwallis into New Jersey. Later he took part with Howe in the battles of Brandywine and Germantown, and in 1779 was made lieutenant colonel of a force of cavalry and light infantry. With this force he operated in the South until the fall of Yorktown, in 1781, and returned to England the following year. As a cavalry leader he gained a reputation for cruelty, especially at Waxhem Creek and at Camden, where he routed a part of the force under General Gates, but was defeated by General Morgan at Cowpens early in 1781. He served in the British Parliament for a term of years, was made a general in 1812, and became a baronet in 1815.

TARN (tärn), a river of France, one of the chief tributaries of the Garonne. It rises in the Cévennes Mountains, receives the Agout and the Averyon, and has a length of 215 miles. The valley is rich in the vine, coal, and cereals.

TARNOPOL (tär-nô'pôl-y'), a city of Austria, in Galicia, on the Sereth River, 75 miles east of Lemberg. It has railroad facilities and is noted as a horse market. The manufactures include machinery, clothing, and furniture. A large part of the inhabitants are Poles and Jews. Population, 1920, 33,853.

TARPEIAN ROCK (tär-pē'yăn), the name of a precipitous rock forming a portion of the Capitoline Hill in Rome, so named from Tarpeia, daughter of Spurius Tarpeius, governor of the citadel on the Capitoline of Rome. It is related that the Sabines bargained with the Roman maid to open the gate of the fortress to them, and as a reward promised her the golden ornaments worn on their arms. As they passed through the gates, they threw on her their shields, saying, "These are the ornaments we bear on our arms." She was crushed to death and buried on Tarpeian Hill. Ever after traitors were put to death by being hurled headlong from the hilltop.

TARPON (tär'pŏn), a large fish which is closely related to the herring. It is found in the West Indies and the waters off the southeastern coast of the United States. The eyes are large, the mouth is placed obliquely, and the dorsal fin is high. It grows to a length of four to six feet and has great power in leaping and swimming. While the flesh is not valued highly, the tarpon is valuable for its silvery cycloid scales, which are used in making ornamental work. This fish affords much sport in angling. Tarpon fishing is popular along the southern coast of Florida and Texas.

TARQUIN (tär'kwĭn), or **Tarquinius, Lucius,** fifth legendary king of Rome, who is sometimes called *Priscus,* meaning *The Elder.* Tradition makes him the son of Lucumo, a Corinthian nobleman of Etruria, who subsequently settled in Rome in accordance with the advice

of his wife, the prophetess Tanaquil. It is alleged that an eagle descended from a high eminence and snatched his cap while on the way to Rome, but afterward restored it. From this circumstance future honors were predicted for him in the Roman city, and his name was changed to Tarquin. King Ancus Martius made him the guardian of his children and gave him high position at the court, and, after the death of the king, he was chosen his successor. He defeated the Latins and Sabines on several occasions, thus adding numerous towns to Roman territory. Tarquin made vast improvements at Rome, where he constructed sewers and baths, erected the Forum and the Circus Maximus, and laid the foundation for the capitol. He began the great walls defending the city, and instituted several of the celebrated Roman games. His successful reign of 38 years came to an end about 578 B. C., when he was assassinated by friends of the sons of Ancus Martius.

TARQUIN, or **Tarquinius, Lucius,** surnamed *Superbus,* son of Lucius Tarquin Priscus, the last of the legendary kings of Rome. He was the son-in-law of Servius Tullius, whom he murdered in 534 B. C. to attain the Roman throne. His government was cruel and tyrannical, but his bold and warlike energy caused Rome to gain great advantages in military power and wealth, causing it to rise to the most eminent place among the Latin confederate states. He abridged the privileges of the plebeians, banished and proscribed many of the senators, and controlled the nation without consulting the senate. Many of the plans laid by his father were carried out, and he likewise improved and strengthened the city. He conducted a siege of Ardea, a strongly fortified town of the Rutuli, in 510 B. C., but during his absence a rebellion was organized under the leadership of Lucius Junius Brutus, and he was exiled by the senate and the army revolted against him. He made three unsuccessful attempts to regain his power, in which he was joined by several neighboring cities, but was at last compelled to abandon the enterprise and flee to Cumae, where he died in 495 B. C.

TARRYTOWN (tăr'rĭ-toun), a village of New York, in Westchester County, 25 miles north of New York City. It is situated on the east side of Tappan Bay, an extension of the Hudson River, and is on the line of the New York Central Railway. The location is on ground rising gradually from the river, furnishing a fine view of the bay, and it is popular as a residential center. Among the institutions are the Castle School (for girls), the Hackley School (for boys), and the Tarrytown Lyceum, which contains a library of 5,000 volumes. A short distance north of the village is the graveyard of the Dutch Church, in which the remains of Irving are buried. The older buildings include the Dutch Church, erected in 1699, and the Philipse Manor House, dating from 1683. The village has public waterworks, electric lighting, and manufactures of machinery and automobiles. *Sunnyside,* the home of Washington Irving, is at Irvington, about two miles south of the village. Major André was captured at Tarrytown in 1780. Population, 1905, 5,370; in 1920, 5,807.

TARSHISH (tär'shĭsh), the name of an ancient commercial emporium mentioned in the Old Testament. It is first spoken of in Gen. x, 4. However, in this instance reference is probably made to Crete and Rhodes. Later references are believed to refer to settlements by the Phoenicians in Spain at the mouth of the Guadalquiver. The latter locality is supposed to be referred to from the fact that its products are identical to those connected with the region of Tarshish.

TARSUS (tär'sŭs), an ancient city in Asia Minor, in the Turkish province of Adana, 10 miles from the Mediterranean. It is located on the Cydnus River, in a fertile region, and has a considerable trade in cotton, wheat, barley, gallnuts, and various manufactures. Tarsus has a number of fine mosques and public baths, and near it are ancient ruins of extensive walls, theaters, and public buildings. The city was founded by Sardanapalus. It was captured by Alexander the Great, but afterward fell into the possession of the Romans, under whom it became a city of great importance. It was long a powerful commercial rival of Antioch, Alexandria, and Athens. Cleopatra and Antony ascended the Cydnus as far as Tarsus. The apostle Saint Paul and several Greek scholars were born at Tarsus. Population, 12,500.

TARTAR (tär'tẽr). See **Cream of Tartar.**

TARTAR EMETIC, the name applied to a double tartrate of potassium and basic antimony. It is made by preparing a paste of acid potassium tartrate and antimonious oxide, which are mixed with water and allowed to stand for several hours, when the compound is boiled and allowed to crystallize. The taste is sweetish, but it leaves an unpleasant sensation in the mouth. Though soluble in water, it cannot be dissolved in alcohol. Tartar emetic is a powerful irritant. It is used in reducing fever and sometimes to produce vomiting, but physicians do not prescribe it as much as formerly, for the reason that it has a depressing effect upon the heart and nervous system.

TARTARIC ACID (tär-tăr'ĭk), the acid found in grapes, pineapples, tamarinds, and other fruits. It is prepared commercially from *argol,* an impure potassium acid tartrate deposited from wine by converting it into a calcium salt, decomposing with sulphuric acid, and allowing the solution to crystallize in a warm place. Tartaric acid is deposited in the casks in which wine is kept. This form of the acid may be purified by crystallization from boiling water and converted into cream of tartar. Tartaric acid crystallizes in large prismatic crystals and is soluble in about half its weight of water. By the action of heat

it is converted into several other acids, whose composition depends on the temperature at which the tartaric acid was decomposed. It is very sour to the taste, but is inodorous, and has a marked action on several metals, such as iron and zinc. Tartaric acid is useful in making lemonade, in calico printing and dyeing, as a medicine, and for making baking and soda-water powders.

TARTARS (tär'tẽrz), the name usually applied to a class of people inhabiting parts of Asiatic Russia, principally the steppes of Central Asia. It has reference chiefly to Moslems of Turkish origin. Tribes of Tartars, different from the Turks, comprised the Mongolians, who migrated from the northern part of China and Central Asia toward the west in the period extending from the 4th to the 10th century, and of whom descendants still occupy parts of southern Russia. In the 12th century large numbers of true Tartars joined Genghis Khan and marched under his leadership from Chinese Tartary to Europe. Chinese Tartary is a region in northern China, whence the true Tartars moved westward. Little Tartary, a term frequently applied to southern Russia, comprises the governments of Astrakhan, Orenburg, Ekaterinoslav, the Crimea, and the Cossack provinces. The Tartaric language belongs to the Turanian tongues, of which the Turkish is the most typical, but there are many dialects.

TARTARUS (tär'tà-rŭs), in Greek mythology, a son of Aether and Gaea, the father of the giants of Echidna and Typhaeus. In the *Iliad* the name Tartarus is applied to a region as far below hades as heaven is above the earth. This locality was regarded as the place of punishment for the spirits of the wicked. Later poets used the names Tartarus and the Elysian Fields as designating two divisions of hades, the former being occupied by the criminals and the latter by the dead.

TARTARY (tär'tà-rĭ), the name formerly applied to a vast region extending from the seas of Japan and Okhotsk to the Caspian Sea, including southern Asiatic Russia, Turkestan, Mongolia, and Manchuria. Little Tartary included the southeastern part of European Russia, and Independent Tartary was the name applied to the region now included in Turkestan, the latter being still called Tartary by some writers. The name originated from the great hordes of Tartars that moved westward from northern China in the 13th century and formed settlements in the central and western parts of Asia, extending westward as far as the Volga, in Europe.

TASCHEREAU (tà-sh'-rō'), **Elzéar Alexandre,** cardinal, born at Sainte Marie-de-la-Beauce, Quebec, Feb. 17, 1820; died April 12, 1898. He studied at the Quebec Seminary and in 1842 was ordained as a priest. He was connected with this institution about thirty years, first as a professor and later as director. In 1860 he was made director of Laval University, and two years later he became vicar general of the diocese. His efficient services caused him to be made archbishop in 1870, and he was appointed cardinal in 1886.

TASHKEND (tàsh-kĕnt'), **or Tashkent,** a city of Asiatic Russia, in the government of Turkestan, of which it is the capital. It is located on the Tchirtchik River, a tributary of the Syr-Darya, about 400 miles southeast of the Aral Sea, and is surrounded by a fertile region. A lofty wall of brick and stone, about twelve miles in circuit, surrounds the city, which may be entered by twelve gates. The chief buildings include a fortified castle, many mosques and temples, numerous bazaars, and several schools and colleges. Among the manufactures are silk textiles, woolen and cotton goods, ironware, furniture, gunpowder, and utensils. The trade is very extensive, largely for the reason that it is of easy access by caravans, and Russian enterprise is rapidly developing highways and railroads. The streets are narrow and tortuous in the older parts of the city, but in the newer portions improvements have been made by paving, drainage, and the culture of avenues of trees. It has electric lighting, telephones, and street railways. Russia annexed the city and tributary territory in 1866. Population, 1921, 166,045.

TASMANIA (tăz-mā'nĭ-à), **a** state of the Commonwealth of Australia, which includes the island of Tasmania and a number of adjacent islands. The island of Tasmania is situated in the South Pacific, 140 miles south of Australia, from which it is separated by Bass Strait. Its western shore is washed by the Indian Ocean. The form is that of a triangle, measuring 195 miles from north to south and 245 miles from east to west. The area, including the adjacent islands and the island of Macquarie, is 26,385 square miles. Macquarie is situated about 1,000 miles southeast and for administrative purposes belongs to the State of Tasmania.

Description. The coasts are quite abrupt and bold and are indented by numerous bays and harbors. Among the chief inlets are Oyster Bay in the east, Storm Bay in the southeast, and Macquarie harbor in the west. The surface is diversified with chains of mountains which range from 3,000 to about 5,000 feet above the sea. They reach the highest elevation in the northwest, in Cradle Mountain, which has an altitude of 5,069 feet. An extensive plateau region is located in the west central portion, but it is more or less diversified by ridges and isolated peaks. Through the central part extends a valleylike depression, through which numerous spurs of mountains trend in various directions. This central plain has a direction through the island from the southeastern part, from the mouth of the Derwent River, almost due north, to the mouth of the Tamar River. Within the plain are a number of mountain lakes of considerable size, such as Great Lake and Sorell Lake. The

Derwent is the largest river, flowing almost duly southeast into Storm Bay. It receives the inflow from numerous mountain streams and is the largest river of the island. The Huon is in the south, the Gordon and the Arthur in the west, the Tamar and the Forth in the north, and the Swan in the east.

The climate is more equable and temperate than that of Australia, being greatly influenced by the ocean, and it is warmer in the northern than in the southern part. The temperature ranges from 28° in winter to 100° in summer, and the mean temperature at Hobart is 46° during the colder and 63° during the warmer part of the year. Rainfall is greatest in the western part, where it ranges from 40 to 100 inches, and in the eastern section it is from 22 to 30 inches. The forests consist of Huon pine, beech, blue gum, acacia, eucalyptus, blackwood, and other native trees. Many species of birds common to semitropical countries abound, but the mammals common to the island are not numerous. The latter include the kangaroo, wombat, opossum, and wallaby.

Industries. Agriculture and the raising of live stock are the main occupations. Wheat is grown on a larger acreage than any other cereal, but it is exceeded in the areas used in the cultivation of hay and green fodder. Corn, oats, barley, and potatoes are grown extensively. All fruits common to the Temperate Zone thrive, especially cherries, grapes, plums, quinces, almonds, apricots, and peaches. Silk culture and the mulberry tree have been introduced successfully. Sheep are the principal domestic animals, but there are extensive interests in rearing horses, cattle, swine, and poultry. The cultivation of hops is a profitable enterprise.

Mining is carried on with considerable success and copper is the principal mineral. The output of copper has an annual value of about $4,850,000. Material development has been made in the output of gold the last decade. Silver is the third mineral in rank. Other minerals include tin, coal, and iron. Large deposits of sandstone, limestone, and granite abound, and these minerals are quarried extensively for construction purposes. More tin is produced in Tasmania than in any other Australian State, and the mines are chiefly in Mount Bischoff.

The manufacturing enterprises are favored by extensive water power available in the streams and by the fact that Tasmania has an abundance of raw material. Large quantities of butter and cheese are made for export. Mutton and beef are preserved extensively both by curing and freezing, and some interests are vested in canning fruit and fish. Other manufactures include woolen goods, furniture, hardware, earthenware, boots and shoes, and machinery. The leading exports are wool, wheat, sheep, dairy products, lumber, and minerals. A majority of the trade is with Great Britain and ports in Australia, chiefly in Victoria and New South Wales.

Railroad building has received considerable attention. A line extends across the island from Devonport, on Bass Strait, to Hobart, at the mouth of the Derwent River. Another line crosses the northern part of the island from east to west, and these trunk lines have numerous branches to inland points. The total lines aggregate 850 miles, most of which are owned by the government. Considerable coastwise trade is carried in small vessels, and the highways near the larger towns are in a good state of improvement. Hobart, Launceston, and Strahan are the leading ports for foreign trade.

Government. The chief executive power is vested in the Governor, who is appointed by the British crown. He is assisted by a cabinet of six responsible members. Legislative power is vested in the Parliament, which consists of a legislative council of eighteen members elected for six years and a house of assembly of 35 members elected for three years. Those voting for members of the legislative council are limited to a property franchise, while all citizens are eligible to vote for members of the lower house. The right to vote has been extended to both sexes. Educational interests have been liberally stimulated in the establishment of common and secondary schools and by the maintenance of several public and private colleges. The compulsory school attendance extends from the age of seven to thirteen years, and children who reside a long distance from school are carried by a State-owned railroad. The University of Tasmania, in which the educational work culminates, is located at Hobart, and with it is affiliated an institution at Launceston.

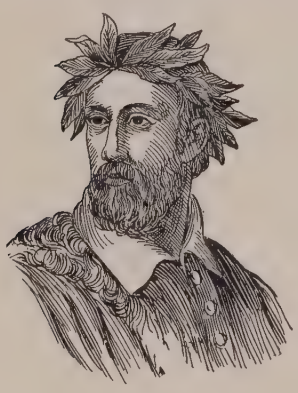
Inhabitants. Formerly the island was inhabited by a native race similar to the races of Australia. They were low in stature, had broad faces, and the skin and hair were dark. These people declined rapidly after the island was colonized by Europeans. It is said that a woman named Tinganina, who died in 1876, was the last native Tasmanian. At present the inhabitants are chiefly British or of British descent. About two-thirds of the people belong to the Church of England and the remainder are Methodists, Roman Catholics, Presbyterians, Lutherans, Baptists, and Jews. Hobart, in the southern part, on the estuary of the Derwent River, is the capital and largest city. Launceston, on the Tamar River, near the northern shore, has a large trade. The emigration and immigration were about equal during the last decade. Population, 1907, 181,624; in 1921, 213,877.

History. Abel J. Tasman (1602-1659), a celebrated Dutch navigator, discovered Tasmania in 1642, and it was named Van Diemen's Land in honor of the Governor of the Dutch East Indies. Cook visited the island in 1769 and in 1803 a British expedition sailed from Sydney with the view of claiming the island for England. They founded a settlement on the present site of Hobart in the same year, and in 1806 located the

city of Launceston. Convicts were transported for some time from Sydney to Tasmania, but a considerable immigration began in 1817, and since then the island has made rapid advancement in population and the development of material industries. It was declared independent of New South Wales in 1825. About 3,000 natives were in the island at the time of the discovery. Convict transportation to Tasmania was abolished in 1853. Many laboring men and settlers left Tasmania on the discovery of gold in Australia in 1851, but most of them returned to make the island their permanent home. Tasmania became a member of the Commonwealth of Australia in 1901.

TASMANIAN WOLF, an animal native to Tasmania, the largest representative of the carnivorous marsupials. It is about four feet long and has a doglike muzzle and a tapering tail. The general color is grayish marked with yellow, and it has a series of stripes on the hind part of the back. In habits it is nocturnal, coming out at night to search for food. It was formerly abundant, but has been nearly exterminated, since it proved destructive to sheep and poultry.

TASSO (tăs'sō), **Torquato,** epic poet, born in Sorrento, Italy, March 11, 1544; died in Rome, April 25, 1595. He was the son of Bernardo Tasso (1493-1569), an eminent Italian epic and lyric poet. His father was exiled shortly after his birth, and his training devolved upon his mother, who sent him to a Jesuit school at Naples until 1554. He joined his father at Rome in the latter year and under his superintendence studied in that city. Afterward he attended educational institutions at Bergamo, Pesaro, and Venice. In 1561 he entered the University of Padua to study law, but while there surprised his friends by publishing an epic poem in twelve cantos, entitled "Rinaldo." This production made him so famous that he was invited to the University of Bologna, where he studied philosophy, rhetoric, and literature. While there he began to write his celebrated poem of "Jerusalem Delivered," receiving financial aid from Cardinal Louis d' Este, to whom his "Rinaldo" had been dedicated.



TORQUATO TASSO.

In 1575 Tasso accepted a position in the court of Alfonso II., Duke of Ferrara, where he completed his "Jerusalem Delivered." Instead of publishing this famous production upon his own responsibility, he submitted it for examination to several churchmen and critics at Rome. The criticisms suggested so preyed upon his mind that he became addicted to morbid fancies, imagining himself condemned to the Inquisition, and in a fit of excitement attempted to stab with his dagger a servant of the Duchess of Urbino, in 1577. An arrest followed this rash act, but he was released after confinement for two days. Subsequently he was affected in a similar way, and Duke Alfonso caused him to be confined at the hospital of Saint Anne at Ferrara, where he remained from 1579 to 1586. He was released in the latter year at the solicitation of Vincent di Gonzaga, and in 1595 was invited to Rome by Pope Clement VIII. to receive the laurel crown of the poet, but died before the ceremony took place. Among the writings of this eminent poet are "Aminta," "Discourses on the Art of Poetry," "Monte Oliveto," "Rime," and "Amadis." Tasso gained the friendship of Charles IX. by visiting France in 1570. His "Jerusalem Delivered" and "Aminta" are considered his master productions.

TASTE (tāst), the particular sensation excited when a soluble substance comes into contact with certain parts of the mouth, particularly with the tongue. The tongue contains the chief end organs of the nerves of taste, including parts of the fifth and ninth pairs of nerves, but the sense of taste extends to the soft palate and the arches of the palate. These nerves end in the papillae, which absorb the substances tasted and convey them to the nerves. The intensity of the sensation depends upon the surface coming in contact with the matters tasted, increasing with the surface exposed to a soluble substance. A temperature of 72° Fahr. is most favorable for producing the sensation. Temperatures much above or below this lessen the ability of the nerves of taste to receive impressions.

Salt and bitter substances have the greatest effect at the back of the tongue, and, this part being reached by the gustatory nerve, a branch of the fifth nerve distributed to the anterior two-thirds of the tongue, which is in sympathy with the stomach, such flavors by sympathy often produce vomiting. Sweet and sour substances affect most notably the edges of the tongue, where branches of the fifth pair of nerves permeate. Since these nerves are connected with the face, an acid by sympathy distorts the countenance. Tastes may be classified by bitter, sweet, acid, and saline. The senses of taste and smell are intimately connected and much of the compound sensation produced by drinking or eating an aromatic substance, such as coffee, is due to smell rather than simply taste. Taste was originally the guide to select food, but it has become so depraved by the force of habit and condiments that it is difficult to discover the natural tastes in man. It is a more reliable guide in the choice of food among

the lower animals than in man, since their taste is not influenced so greatly by habit.

TATTERSALL'S, the name of a market in Grosvenor Place, London, famous as a place for selling, riding, and driving horses. It was established by Richard Tattersall, in 1780, and has continued to remain the headquarters of the turf. This place contains an apartment in which the business of horse racing and betting throughout the country receives attention.

TATTOO (tăt-tōō′), a mark in the skin produced by indelible pigments. The practice of tattooing prevails to a considerable extent with the brown and yellow races, especially among the North and South American Indians, South Sea Islanders, Burmese, Bedouin Arabs, Dyaks, and Mongolians. Tattoos are made by marking the skin with punctures or incisions and introducing into the wounds colored liquids, gunpowder, or other substances, so as to produce indelible figures or designs on the body. The custom is practiced differently in various regions, some peoples placing the tattoos only on the arms or other concealed portions of the body, while in some sections variously designed figures are made in the skin of the face and over practically all parts of the body. It is quite painful to undergo the operation, but barbarians bear it with considerable fortitude, since in most cases the figures indicate degree of rank or are made as a mark of distinction or remembrance. Instruments of steel with small teeth are commonly employed in tattooing, but primitive peoples use bone or stone for that purpose. In many cases the figures are very elaborate and variously colored, often representing animals, landscapes, and historical scenes. The practice is very old, dating from the early history of mankind, and it has been favored by people high in the scale of civilization. Lev. xix., 28, prohibits its use among the Jews in these words: "Ye shall not make any cuttings in your flesh for the dead, nor print any marks upon you." Tattooing is a favorite adornment among the female Bedouins even at the present time. It was practiced in ancient times by the Thracians and Scythians and among the Britons and Irish.

TAUCHNITZ (touk′nĭts), **Karl Christoph Traugott,** printer and bookseller, born near Leipzig, Germany, Oct. 20, 1761; died there Jan. 14, 1836. He learned the printer's art when a mere youth and in 1796 founded an independent publishing establishment at Leipzig. His excellent business capacity and skill caused his institution to prosper, which he ultimately enlarged by adding a bookbindery and a type foundry. He began the issuance of a series of elegant classical works in 1809, which attained a wide circulation in Europe. In 1828 he issued an edition of Homer of extraordinary correctness, this being brought about by offering a ducat to every person pointing out an error. He introduced stereotyping into Germany in 1816 and was the first to apply that art in the publication of music. Later he stereotyped the Koran in the original Arabic and subsequently the Hebrew Bible. His nephew, Christian Bernhard Tauchnitz (1816-1895), founded a large printing business at Leipzig in 1837. He published a series of English translations of German authors and in 1842 began the "Tauchnitz Edition of English Authors," a series of publications now embracing about 3,750 volumes. The Duke of Saxe-Coburg-Gotha made him a baron in 1860. He was appointed consul for Saxony in 1872 and was made a Saxon life peer in 1877.

TAULER (tou′lĕr), **Johann,** theologian and author, born in Strassburg, Germany, in 1290; died there June 16, 1361 He became a Dominican monk in 1308 and studied theology in his native city and Paris. His religious opinions were influenced by Master Eckart and he developed into a mystic, teaching that the worship of God is to be manifest in the heart and life. He preached in Basel, Cologne, and Strassburg, and is the author of many works in the Latin and German. Among his chief writings are "Following the Lowly Life of Jesus" and "Sermons."

TAUNTON (tăn′tŭn), a port city in Massachusetts, one of the county seats of Bristol County, on the Taunton River, 35 miles south of Boston. Communication is by the New York, New Haven and Hartford Railroad and a number of electric railways. It has an abundance of water power derived from the Taunton River. The streets are regularly platted and improved by pavements, waterworks, sewerage, gas and electric lighting, and avenues of ornamental trees. Among the noteworthy buildings are the public library, the county courthouse, the post office, the city hall, the Morton Hospital, the Bristol Academy, and the State insane asylum. Taunton Green and Woodward Spring Park are fine public grounds.

Taunton has a large jobbing trade and is noted as an industrial center. The manufactures include ironware, brick, locomotives, boots and shoes, soap, cotton and woolen textiles, hardware, furnaces, paper, agricultural implements, silver-plated ware, underwear, stoves, and farming implements. Herring fishing is a productive enterprise. The first settlement was made at Taunton in 1638. It was so named from Taunton, England, whence the first settlers came. The place was incorporated as a city in 1865. Population, 1925, 39,255.

TAURUS (tạ′rŭs). See **Zodiac.**

TAURUS, a mountain range in Asiatic Turkey, forming the watershed between the Black and Mediterranean seas and stretching from the upper Euphrates to the Aegean Sea. The slopes toward the Mediterranean are steep and leave a narrow coast plain, but toward the north it merges gradually into the high plain of Asia Minor. Two divisions are included in

the Taurus proper, known as Ala Dagh in the east and Bulghar Dagh in the west. The Anti-Taurus range connects it with the Caucasus, Elburz, and Ararat. The highest peak of the Anti-Taurus is Arjish Dagh, height 13,112 feet, and of the Taurus proper, Bulghar Dagh, 11,415 feet. Between Syria and Asia Minor is the valley of the Cydnus, forming a pass known in ancient times as the Cilician Gates.

TAX, an assessment levied upon persons, property, or business for the support of the government or other public service. It may be said that no system of taxation has yet been devised that rests with equal fairness upon all individuals in the state, and possibly the consummation and application of such a system can scarcely be reached, even in the most democratic form of government. The four principles of taxation laid down by Adam Smith, which have been generally accepted by writers on political economy, may be briefly stated as follows: each individual in a state should contribute to the support of the government in exact proportion to the relative ability of all; the system of taxation should provide a certain and not arbitrary tax upon each individual; each individual should be taxed to pay at the time and in the manner most convenient to himself; and the general system of taxation should be so adjusted that the people may not be pressed to pay more than is actually needed to support the state and supply adequate funds for the public treasury.

Taxes are divided into direct and indirect. *Direct taxation* is the term applied when the tax is paid directly to the municipality or state by the person upon whom it is levied, such as taxes upon real estate, domestic animals, machinery, dogs, an income tax, and a poll tax. On the other hand, in the scheme of *indirect taxation* the tax is levied on one person but really paid by another. Indirect taxes are assessed on commodities and the amount of the tax is added to the price of the commodity, thus requiring the consumer to pay it. This is illustrated by the internal revenue system, in which the stamp tax and excise taxes on tobacco and liquors are added to the commodities taxed. This may be illustrated quite similarly by the tariff system. For instance, if there be a duty of ten cents per pound on coffee, though nominally paid by the importer, it is added to the price of the article and the consumer pays that much more per pound.

The ancient governments levied taxes upon unfriendly nations, and the booty of war obtained by sacking cities was a considerable source of income in supporting the army and building up home enterprises. In many instances private property of subjects was confiscated for use by the state, tribute was exacted for special privileges in consideration of trade and social advantages, and crimes were made punishable by the payment of heavy fines, payable either immediately or in installments. It was customary among the Jews to support the state by contributing the first born of their flocks and the first fruits of their lands, though the rates were increased under different sovereigns. The Roman Empire collected tolls, exacted payments for conferring the privileges of citizenship on individuals, carried away the treasures of conquered nations, and levied tribute upon various articles of trade. Feudalism was a system of land ownership by the sovereigns and nobles, under whom the common laborers were reduced to serfdom and belonged to the soil, while the fruits of the land flowed into the coffers of the rich and powerful to support them in luxury and the nation in authority. The systems of ancient and medieval peoples are still perpetuated in some of the countries of Europe and Asia, but advancement in civilization and educational arts is fast leading to the view held by the American colonists, "No taxation without representation."

Taxation now partakes of various forms and includes taxes levied by the school district, township, municipality, county, state, and nation. The national taxes consist of duties on imports and excise taxes, mostly on liquors and tobacco, with other forms added at different periods, such as stamp taxes and taxes on incomes. All other taxes are direct taxes and are assessments on real and personal properties, according to their estimated value. The assessment of railroad property is made in most instances by a state commissioner or an executive council. The value of property owned by individuals is ascertained by the assessor, whose estimates are subject to revision by a board of equalization, and the taxes are usually payable to the county treasurer, who later distributes the money to the different corporations and individuals entitled to receive the same. This form of direct taxation is with some exceptions the most equitable of any save that of the income tax.

In an *income tax* each individual pays according to the amount of profit per annum, while a *property tax* requires each to pay in proportion to the amount of property owned, but one's revenues are not always proportional to one's property. Besides, property is liable to double taxation in the case of mortgages, and in the form of money and valuable paper it is quite frequently withheld from enlistment by the assessor. *Poll taxes* are direct taxes, usually levied on those subject to military duty, who are required to pay from fifty cents to three dollars per year or work to the extent of that amount on the public highway. In case the tax levied on property is not paid, any personal or real property owned by the person taxed is subject to sale for nonpayment. Tax sales are quite common and usually take place about the first of December, the property tax being due usually the first of January, thus giving the payer about

eleven months' time to make payment before the sale. Persons owning property sold for taxes are given two to three years in most states to make redemption, which is done by paying the taxes together with the cost and interest. Public property, such as courthouses and school buildings, is exempt from taxation in most countries. The houses of worship and the property of clergymen are exempt quite generally. See **Single Tax.**

TAXIDERMY (tăks'ĭ-dĕr-mў), the art of preparing and preserving the skins of animals and of mounting them in a lifelike manner. The art is of considerable antiquity, but it reached a high state of development only about three centuries ago. Now vast collections of practically all kinds of animals may be seen in mounted condition in national educational institutions, colleges, and municipal museums of nearly all civilized countries, and their careful preservation has been the means of greatly stimulating research by naturalists and students. The process varies with the class of animals to be treated. It may be said that the general plan is to remove the skin, to which the feet, tail, hairs, and part of the head are left attached. All these parts are treated with an arsenic preparation, or with a powder containing arsenic, camphor, burnt alum, oak bark, and other substances, after which the skin is stuffed in such a manner that the form and size of the animal are carefully restored. The product is then perfumed with an aromatic substance, glass eyes are adjusted, and it is mounted to represent the living form. Reptiles, mammals, fishes, birds, and animals of all classes may be treated and preserved in this manner.

TAY (tā), the longest river of Scotland, which rises in the southern Grampians and, after a course of 120 miles toward the east, flows into the North Sea. It has an estuary of about three miles, but the tide flows a mile above Perth, to which city it is navigable for vessels drawing ten feet. The principal tributaries include the Dochart, Lyon, Garry, Tummel, Arn, and Almond. The cities on its banks are Dunkeld, Aberfeldy, Perth, and Dundee, the last mentioned being its chief port. The Tay valley is fertile. An area of 2,400 square miles is included in the basin. Valuable salmon and other fisheries occur in the Tay and its estuary.

TAYLOR (tā'lĕr), a city of Texas, in Williamson County, 35 miles northeast of Austin, on the Missouri Pacific and the Missouri, Kansas and Texas railways. The surrounding region is a fertile farming country. It has electric lighting, waterworks, a creamery and a large trade in wool, cotton and live stock. The manufactures include bread, machinery, and cotton-seed oil. The shops of the International and Great Northern Railway are located here. Population, 1900, 4,211; in 1920, 5,965.

TAYLOR, Andrew Thomas, architect, born in Edinburgh, Scotland, in October, 1850. He studied in Edinburgh and London and later took courses in several institutions on the continent. In 1883 he emigrated to Canada and established a line of successful work as an architect in Montreal. For some years he was professor of architecture in the Presbyterian college of Montreal and designed many buildings in that city. He published "Dominion Drawing Books" and "Towers and Steeples of Christopher Wren."

TAYLOR, Bayard, author and traveler, born in Kennett Square, Pa., Jan. 11, 1825; died in Berlin, Germany, Dec. 19, 1878. He was the son of a farmer, who provided for his education at West Chester and Unionville, and at the age of seventeen he became apprenticed to a printer in West Chester. While there he began to develop remarkable interest and talent for writing poetry and contributing to various newspapers and magazines. His first published work was a volume of poems under the title "Ximena," in 1844, and in the same year he made an extensive tour of Europe, which enabled him to publish, in 1846, his "Views Afoot." Accounts of the tour through France, Germany, England, and Italy were published in the New York *Tribune* and the *Saturday Evening Post,* and on returning to America he was employed by Horace Greeley as an editorial writer on the New York *Tribune.* In 1849 he made an extended tour of California and Mexico, which he reported to the *Tribune,* but later published an interesting account of it in his "Eldorado, or Adventures in the Path of Empire."

BAYARD TAYLOR.

Taylor made a tour to Egypt in 1851, visited Calcutta and China in 1852, and returned to the United States in 1854 to prepare descriptions of his journey and lecture in various cities. In 1857 he married Maria Hansen, the daughter of a German astronomer, and in 1862 was made secretary of legation at Saint Petersburg, Russia. His next tour was to Iceland, in 1874, and four years later he became United States minister at Berlin, where his death occurred. The writings of Taylor show a broad and genial spirit and overflow with a hearty sympathy. His lusty imagination and interesting style made his writings extremely popular and led to their wide translation. Among the productions not named above are "Journey to Central Africa," "Pictures of Palestine," "Visit to India, China, and Japan," and "Northern Travels." His poems include "Quaker Widow,"

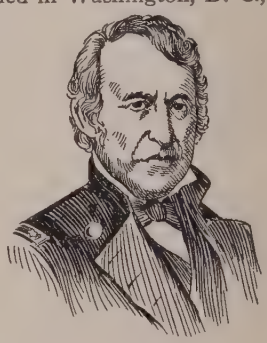
"Bedouin Song," and "An Old Pennsylvania Farmer." His principal novel is "The Story of Kennett." He translated from the German Goethe's "Faust," Schiller's "William Tell," and Richter's "Hesperus." His wife, Maria Hansen (born in 1829), translated many of his works into German. She edited his "Dramatic Works" and aided Horace E. Scudder in publishing "Life and Letters of Bayard Taylor."

TAYLOR, Henry Clay, naval officer, born in Washington, D. C., in 1845; died July 28, 1904. He graduated, in 1863, at the United States Naval Academy and was immediately assigned to naval service on the Gulf of Mexico. In 1864 he took part in the battle of Mobile Bay. Subsequent to the war he was assigned duty in the South Pacific station and in 1867 returned to the United States. Besides instructing at the Naval Academy, he took part in the surveying expedition of 1870, and in 1886 was made commandant of the navy yard at Norfolk. He was appointed president of the Naval War College at Newport, R. I., in 1893, served for some time as superintendent of the naval academy at Annapolis, and in 1897 became commander of the battleship *Indiana.* During the Spanish-American War he was with the fleet under command of Admiral Sampson, took part in the bombardment of San Juan, and on July 3d rendered efficient service in the naval fight that ended in the destruction of Cervera's fleet at Santiago. In 1902 he was made chief of the Bureau of Navigation and as such published a number of valuable reports.

TAYLOR, Jeremy, eminent churchman, born in Cambridge, England, Aug. 15, 1613; died Aug. 13, 1667. He graduated at Cambridge University, where he became a fellow in 1633, and later was stationed at Oxford. The bishop of London made him rector of Uppingham in 1638, where he became a supporter of the royal army, and in consequence was deprived of his charge by the Parliament. Subsequently he settled at Newton, Wales, to devote himself to literature. In 1642 he published "Episcopacy Asserted," for which he was awarded a degree by Oxford, and in 1647 appeared his most important work, "The Liberty of Prophesying." After the restoration, he was given a charge in Ireland, and later became a member of the Irish privy council of the University of Dublin. Among his later writings are "The Life of Christ," "Holy Living," "Golden Grove," "Twenty-Seven Sermons," and "Holy Dying."

TAYLOR, William, missionary and author, born in Rockbridge, Va., May 2, 1821; died May 2, 1902. He attended the public schools, began work as minister in 1841, and two years later joined the Baltimore conference of the Methodist Episcopal Church. In 1849 he went as missionary to California and in that year organized the first Methodist Church in San Francisco. He was prominent as an evangelist from 1856 to 1861 and in the latter year made an extended tour of Europe and Asia. He was in Australia as evangelist from 1863 to 1866, in South Africa in 1866, in the West Indies in 1867, and in Ceylon from 1870 to 1876. Subsequently he established churches in India and South America and in 1884 became missionary bishop of Africa, from which position he retired in 1896. Few men attained greater success in evangelistic work. His services were especially effective among the Kaffirs and other natives of South Africa. His publications include "Christian Adventures in South Africa," "Seven Years' Street Preaching in San Francisco," "Election of Grace," "Our South American Cousins," "Infancy and Manhood of Christian Life," "Four Years' Campaign in India," "Story of My Life," "Reconciliation, or How to be Saved," and "Flaming Torch in Darkest Africa."

TAYLOR, Zachary, twelfth President of the United States, born in Orange County, Virginia, Nov. 24, 1784; died in Washington, D. C., July 9, 1850. He was the third son of Richard Taylor, a colonel in the Revolutionary War, who, in 1785, removed to the vicinity of Louisville, Ky., where he made his home in the then sparsely occupied region. The pioneer conditions of the country afforded little school advantages, but young Taylor was surrounded in early life by conditions and circumstances well adapted to develop a sturdy character and fit him for an eventful career. He became a lieutenant in the army in 1808 and two years later was promoted to the rank of captain. In the same year he married Margaret Smith, a lady of Maryland. He commanded at Fort Harrison in 1812, where he repulsed an attack of the Indians under Tecumseh and received the brevet of major. In 1814 he commanded a force against the British and Indians on Rock River, became lieutenant colonel in 1819, and in 1832 was made colonel, with headquarters at Prairie du Chien, Wis.



ZACHARY TAYLOR.

Taylor occupied his time in the Black Hawk War and other campaigns until 1836, when he was transferred for service against the Seminole Indians in Florida, defeating them at Okeechobee. This gallant conduct caused his promotion to the rank of brigadier general, and in 1838 he was appointed to the chief command in Florida. In 1840 he was transferred to the western department of the army and in 1845 was ordered to the defense of Texas, which had been annexed to the United States. He occupied Corpus Christi with a force of 4,000

men and in March, 1846, drove the enemy across the Rio Grande, occupying Matamoros in May. Monterey was captured by him in September and in February, 1847, he won the Battle of Buena Vista, where he was opposed by an army of 20,000 men under Santa Anna. In the meantime he won the battles of Palo Alto and Resaca de la Palma, causing thereby patriotic enthusiasm throughout the Union.

The decided victories won by Taylor caused the Whigs to nominate "Rough and Ready," as he was called, for the Presidency. The nomination was given to him on the fourth ballot at the Philadelphia convention in 1848, defeating Henry Clay, Daniel Webster, and General Scott. The campaign was one of considerable excitement, since General Taylor was a slaveholder and had not voted for forty years, but he defeated Lewis Cass, the Democratic candidate, receiving 163 electoral votes while his opponent received 127. He was inaugurated March 5, 1849, but there was a Democratic plurality in Congress, while the Whigs were in a hopeless minority and the Free-Soil party held the balance of power. This condition in the legislative branch and important questions agitating the nation made it extremely difficult for the newly elected President, who was wholly unaccustomed to the ways of the statesman. Among the events of his administration are the admission of California, the settlement of the boundaries of Texas, and the organization of the new territory acquired from Mexico. Worn out by public cares, he died sixteen months after taking the oath of office. He was buried in Cave Hill Cemetery, Louisville, Ky.

TAYLORVILLE, a city of Illinois, county seat of Christian County, 25 miles southeast of Springfield. It is pleasantly situated on the Wabash and the Baltimore and Ohio Southwestern railroads. The chief buildings include the high school, the Carnegie Library, and the county courthouse. Coal mines are worked near the city. It has manufactures of brick, tile, chemicals, and farming implements. The municipality has public waterworks and a system of sanitary sewerage. It was settled about 1839 and incorporated in 1882. Population, 1900, 4,248; in 1920, 5,866.

TCHAD. See **Tsad.**

TEA, a genus of shrubs and trees allied to the camellia. They include species that vary in height from four to thirty feet. The most important species is the *tea shrub,* or *Chinese tea,* which in a native state grows to a height of twenty to thirty feet, but its development is limited to five or six feet when cultivated for its leaves, the important product that yields the tea of commerce. This plant has lanceolate leaves two to six inches long, produces large white flowers of fine fragrance, and is a hardy evergreen species. It is propagated from the seed, but the young plants are not ready for picking the leaves until three years old. They yield best when eight to ten years old, and later diminish in the production of leaves, until finally new plants must be set out in their stead. The cultivated species of tea possess a wide adaptability to climate, being excelled in this characteristic among food plants only by wheat. The range of cultivation extends from 39° north latitude in Japan, to regions south of the Equator, including Java, Australia, South Africa, and southern Brazil. It can be grown successfully in the portion of North America lying south of a line drawn from California to South Carolina, but the greater cost of labor

LEAVES AND FLOWERS OF TEA.

in the United States as compared to that of Asia has made it possible to successfully compete with the vast productions of China and Japan. A number of tea farms have proven quite successful under Japanese management in California, and in many sections of the southern states the tea plant is grown with profit.

Vast tea plantations are maintained in China and Japan, where the industry of growing tea for the market has been established for many centuries. The leaves are picked by hand, an enterprise engaged in by the whole family, and the first crop is gathered in the spring, usually in April, the particular month of the year de-

pending upon climatic conditions. A second crop is harvested about a month later, this being the most valuable of the season, and two succeeding crops are produced afterward. Native names are applied to the different grades of tea, *hyson* meaning spring crop, *pounchong* signifying wrapped tea, and *souchong* meaning small kind. Both green and black teas are procured from the same plant, this depending upon the process of curing the leaves. *Green tea* is made by drying the leaves quickly in pans soon after being gathered. They are then rubbed lightly between the palms of the hands or taken out and rolled on a table, after which they are placed in the pans and dried a second time. *Black tea* is secured by drying the leaves in shallow baskets in the sun and air, during which a saccharine fermentation is supposed to take place in conjunction with a volatile oil. During the chemical changes that occur while fermenting and drying, the leaves change slightly in color, and they are afterward roasted in an iron vessel and dried over a charcoal fire. The black color results from manipulation and drying, and the flavor is greatly modified in the process. Professional tea tasters are employed to sample and classify the tea according to its flavor. Green tea includes hyson, young hyson, hyson skin, gunpowder, imperial, and caper. Among the species of black tea are the pekoe, flowery pekoe, orange pekoe, pekoe souchong, congou, bohea, and souchong. Adulterations in tea are made by adding leaves of other plants and artificial coloring is frequently used, such as Prussian blue and a mixture of indigo and gypsum.

According to Chinese legend, Emperor Chinnug discovered the virtues of tea in 2737 B. C., but it is quite probable that positive reliance cannot be placed upon the claim, since all knowledge of agriculture is traced to that sovereign by Chinese writers. Tea culture was carried from China to Japan in the 13th century, and these two countries were the only tea-producing regions until the early part of the 19th century. The Dutch established tea plantations in Java in 1825, whence tea culture spread rapidly throughout the East Indies. Soon after it was established in Ceylon, the West Indies, South America, Australia, and Southern Europe. The principal constituents of tea are a volatile oil, thein, tannin, and albuminous compounds. It has some soluble mineral matter, including phosphoric acid and potash. Thein is the active principle. Tea is imported principally from China and Japan.

TEACHERS' COLLEGE, an institution for the training of teachers, founded in New York City in 1880. Ten years later it was made a part of the educational system of Columbia University, in which it is represented by its dean and a member of the faculty, but it maintains a separate corporate organization. The courses consist of pedagogical work. They embrace the history and philosophy of education, educational psychology, school administration, ancient and modern languages, mathematics, domestic and fine arts, the sciences, music and voice culture, physical education, manual training, and kindergarten. The Speyer School and the Horace Mann School are observation and practice institutions affiliated with the college. It maintains a large number of university extension courses, and ranks as the most important school of this class in the United States. The value of its property is $5,150,000. It is attended by about 4,900 students.

TEACHERS' INSTITUTE, an assemblage held under county or State supervision, designed as a normal or short training school for teachers and those who desire to engage in the teachers' profession. The first teachers' institute was held in 1839, when Henry Barnard, secretary of the Connecticut board of education, called the teachers of Hartford County for a month's session at Hartford, and, with several instructors, gave those in attendance instruction in the theory and art of school-teaching. Soon after teachers' institutes were organized in many of the states, being provided for in most cases by statutory laws. The sessions are held annually, ranging from three days to four weeks, and the funds are supplied by the State or county, or are secured partly by a small admission fee of those in attendance. In most states the institutes are held under the direction of the county superintendent, who selects assistant instructors, subject to the approval of the State department of public instruction.

Many teachers' institutes partake of the nature of academic instruction and normal training, for which purpose a graded course of study covering three or four years is pursued systematically, the object being to induce consecutive study during the year. However, the principal object is to inculcate higher ideals of life and teaching, stimulate educational enthusiasm, and bring the teachers in contact with progressive methods and instructors of successful experience and recognized ability. In some instances a practice department or a round-table program is provided, at which those in attendance either alternate in giving model lessons or relate their methods of teaching and discipline.

TEAK (tēk), a large tree of the vervain family, native to Java, Ceylon, and Southern Asia. It has large, ovate, opposite leaves, terminal panicles of white flowers, and round fruit about the size of cherries. The teak native to the East Indies attains a height of 200 feet, towering above other forest trees in the native woods. Its deciduous leaves are ten to twenty-four inches long and six to eighteen inches wide. It yields lumber resembling mahogany in appearance, which is not attacked by insects, and is used extensively in shipbuilding and for general construction purposes. The

TEA PLANT.

(Thea sinensis).

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A. Flowering Branch. 1. Section of Flower. 2, 2. Stamens. 3. Section of Ovary. 4. Pistil and Calyx. 5, 6. Fruit. 7. Seed. 8. Section of Seed. 9. Embryo.

African teak is an allied species and is frequently called *African oak*. The great durability of teakwood is due to an aromatic oil, which gives it a peculiar smell when freshly cut. A red dye is made of the leaves, which is employed in dyeing cotton and silk textiles.

TEAL (tēl), the common name of a class of small ducks. They are very abundant and highly esteemed for the table. The teal duck of North America is found in large numbers throughout the region from the Atlantic to the western highlands, and in the spring migrates to breed in the regions far north. The *blue-winged teal* and the *green-winged teal* are the two common species. Both are rapid flyers and swimmers and dive with considerable skill. The body is about 15 inches long, with an alar extent of 25 inches. The color is grayish with markings of blue and green, and the head is slightly crested. Several species of teal ducks are native to Western Europe, among them the common teal. It migrates as far as northern Russia and Scandinavia in the spring, and in the fall returns to the Mediterranean and warmer regions of Europe and Africa. The male is brownish-red with various black and green markings, and the female is a dull-gray color. The Romans domesticated the teal duck for its flesh and eggs, and it is still reared on some of the smaller farms of Europe.

TECHNICAL EDUCATION, the training that has for its object improvement in the arts and trades. The term is commonly used to designate such instruction as is useful in pursuing the industrial arts or has for its object the special preparation for a vocation. Schools which make technical education a direct object are frequently divided into two general classes, those giving instruction in working trades, such as carpentry, watchmaking, tanning, decorating, engraving, and dyeing, and those which train for the commercial trades, which have to do with the retailing of glass, ceramic wares, etc. With the latter are included the trade schools that train craftsmen for practical work at any trade. Frequently a third class is considered as belonging to the schools that further technical education, embracing such as give particular attention to educate its students for superintendents and managers of industrial establishments, and for consulting and designing architects and engineers. Schools of this class are known by various designations, such as institutes of technology, engineering schools, polytechnical institutes, and schools of applied science.

Much instruction along the line of technical education is given in many colleges and universities that do not make training for the arts and trades a direct object, but the utility of preparing students especially along this line has become more generally accepted since trades are more closely organized and the branches of work in the industries have been diversified. It cannot be said that this training was ever fully excluded from the larger institutions of learning, but its importance was especially emphasized at the International Exposition in London, in 1851, which revealed the superiority in all that relates to the application of arts and beauty to manufactures produced by the European nations. It was particularly noticeable that the countries of Europe which had facilities for special instruction designed to advance science, especially France, Germany, and Switzerland, displayed products which were superior in design and workmanship to those of countries not advanced in the means to extend education in the arts and sciences. The more recent expositions, including those at Buffalo, Saint Louis, Portland, and Seattle, have given emphasis to the importance of this training, and it has come to be an established fact that a theoretical knowledge of principles is necessary in addition to mere manual dexterity and empirical insight.

Technical education in the highest degree must begin in the primary school and be based on general literary culture. The branches of study recognized as essential are drawing, chemistry, and geometry. Typical examples of schools in the United States are those that teach dyeing and extend knowledge of textiles, such as located at Lowell and New Bedford, Mass., and the School of Industrial Art of the Pennsylvania Museum, at Philadelphia. At Krefeld, Germany, is a famous institution which has taken up for study the subject of government control of public utilities, such as waterworks, gas and electric light plants, and street railways. This institution provides thorough instruction in the mechanism and pattern designing involved in weaving and of the chemistry and technology of dyeing. Other noted institutions of this class are the School of Silk Weaving, Zurich, Switzerland; the Advanced School of Weaving, Lyons, France; and the textile department of the Manchester Technical School, England. Schools in which carpentry and the building trades are taught are quite numerous in Austria and Germany, including those located at Cologne, Chemnitz, Munich, and Nuremberg, and the School of the Technological Industrial Museum, Vienna. Schools for training foremen and superintendents in mechanical industries are maintained at Angers, Châlons, and Lille, France. The courses in these schools vary from three to five years, and in many distinct instruction is provided for boys and girls.

Until recently schools of applied art were not numerous in Canada and the United States, but there is a growing sentiment in favor of training for the handicrafts. Many states have made provision for manual training in the public schools, either in special classes or by systematic instruction through the grades from the primary department to the high school.

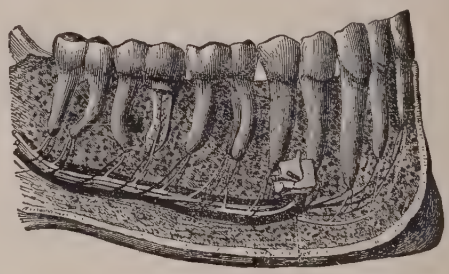
The Cooper Union of New York City is one of the most prominent institutions affording instruction preparatory for commercial pursuits and the working trades. Others of a similar class include the Drexel Institute, Philadelphia; the School of Industrial Art of the Pennsylvania Museum; the Maryland Institute, Baltimore; the Lowell School of Design, Boston; the Art Academy, Cincinnati; the Chicago Art Institute, Chicago; the New York Trade Schools, New York; and a number of colleges which teach the essentials of agriculture and mechanical arts. In quite a number of cities night schools are maintained at which provision is made for those who are occupied during the day. The learned societies of America also include many associations that are maintained especially to extend knowledge of industrial arts. These include the American Institute of Mining Engineers, the Society of Naval Architects and Marine Engineers, the Society for the Promotion of Agricultural Science, and the Society for the Promotion of Engineering Education.

TECUMSEH (tē-kŭm'sĕ), or **Tecumtha,** an Indian chief of the Shawnees, born near the site of Springfield, Ohio, about 1768; slain Oct. 12, 1813. He was a brother of Elkswatawa, an Indian prophet of wide influence, and in 1791 led the Shawnee Indians on the warpath against the Kentucky militia. In 1805 he joined his brother in an endeavor to form a confederacy of the western Indians against the whites, visiting for that purpose the region tributary to the Great Lakes and various parts of the Mississippi valley. His confederated band collected on the Upper Wabash River, while he was organizing the southern tribes near the Gulf of Mexico. Gen. W. H. Harrison met the Indians under Elkswatawa at Tippecanoe on Nov 7, 1811, and put them to rout. Tecumseh joined the British in the War of 1812 and aided them with his braves in Michigan, at the battles of Raisin River and Maguaga. His services being of value, he was made brigadier general, and at the siege of Fort Meigs had joint command with General Proctor. When Colonel Dudley led the Kentucky militia into an ambush, he protected the American forces from massacre. Subsequently he commanded at the Battle of Lake Erie, where he was slightly wounded, and on Oct. 12, 1813, led the right wing of the British forces at the Battle of the Thames. He had previously expressed the opinion that he would be killed in the battle and accordingly discarded his British uniform for the costume of an Indian warrior, fighting desperately until he was mortally wounded.

TECUMSEH.

TE DEUM (tē dē'ŭm), the first two words of the hymn beginning with the words, *Te Deum laudamus,* of which the English version is, "We praise thee, O God." The Latin hymn of this title is generally ascribed to Saint Ambrose and to Saint Augustine, but some authorities assign it to Hilary of Poiters. It is used extensively on occasions of triumph and thanksgiving and has engaged the genius of many musical composers. In the Anglican Prayer Book it forms part of the morning prayer. It is recited in the Roman Catholic Church on all Sundays, except those of Advent and Lent, as well as on numerous festivals.

TEETH, the hard, bony structures situated in the mouth or near the entrance to the pharynx of vertebrates, which are partially exposed when developed and employed for seizing and chewing food. They are hard and dense



PERMANENT TEETH OF LOWER JAW.

and in most mammals, when developed, consist chiefly of dentine or ivory invested on its upper surface and crown with enamel and at its base with cement. The roots of the teeth, embedded in the gum, have a small opening leading into the pulp cavity, through which numerous blood vessels and nerves penetrate. The teeth of most mammals are classified as incisors, canines, and grinders, though there is a vast difference in the structure and size, which depend largely upon the food and habits that characterize the animals. In the lion and other carnivorous mammals they are formed to serve in flesh eating, and in the ox and herbivorous animals they are designed more particularly for cutting off and grinding grasses. On the other hand, in some animals they are specially fitted to cut trees, as weapons of defense or means of anchorage, or to aid in constructing habitations.

Many species of fishes have compound teeth, and, whether simple or compound, they are shed and renewed at different stages of their lives. Birds have no teeth, but the name is applied to a notch in the bill in some species,

which is large and conspicuous among the birds of prey. Toads, turtles, ant-eaters, and tortoises have no teeth, but instead have a mouth constructed with a view to facilitate compressing and swallowing the food. Serpents have a form of teeth on the palate, aside from those on the jaw, but the poison fangs of venomous species are the most conspicuous. Some edentates, as the ant-eaters and pagolins, have no teeth, though they belong to the mammals. The two tusks of the elephant are modifications of the incisors in the upper jaw, but besides these it has one or two molars on each side of the two jaws. Naturalists have studied the teeth of extinct and living animals with such minuteness that they are able to determine the genus with much accuracy by examining the tooth structure and form. Teeth do not constitute a part of the skeleton, but, like the hairs, belong to the skin or exoskeletal part of the body.

HUMAN TEETH. Man and most mammals have 32 teeth when in the adult state. In man each half-jaw has eight teeth, those on corresponding sides being similarly shaped and arranged. There are *two incisors* in each half-jaw, situated nearest the middle of each jaw; the next one is called *canine,* or *eyetooth;* the next two, *bicuspids;* and the next three, *grinders,* or *molars.* The incisors and eyeteeth have one fang or root, while the others have two or three fangs. Children are born toothless, but soon begin to develop a temporary set of teeth, called *milk teeth.* The first to appear are the incisors, which begin to cut through the gums at about the age of seven months. The first molars appear at nine months and the canines at eighteen months, while the last of the molars do not appear until the age of two or three years. There are twenty milk teeth in all, the number consisting of eight incisors, four canines, and eight molars.

The first set of teeth is usually still perfect at six years, but the jaws contain the crowns of all the second set, except the *wisdom teeth.* At that age the crowns of the permanent set begin to press against the roots of the milk teeth, and the latter become slowly loosened and drop out. The last of the permanent set to appear are the wisdom teeth, which are sometimes delayed until the age of 20 to 23 years. A dense substance resembling bone, called *dentine,* constitutes the greater part of the interior of the teeth. The crown of the tooth, which is exposed to wear, is covered by a protective sheath of *enamel,* a hard, white substance. It is the hardest of all animal textures and contains about 97 per cent. of mineral matter. The fang of the tooth is covered by a *cement,* which is formed of a layer of true bone. Within the tooth is a pulp cavity filled with a soft and highly vascular substance called the *dental pulp.* The roots of the teeth are set in sockets of the jawbone, which is lined with a membrane that forms a soft cushion.

Decay of the teeth results from portions of food being lodged between them and from a sediment called *tartar* being deposited, both tending to injure the teeth and to make the breath offensive. Dentine once broken off is not restored. An injury of this kind is soon followed by the tooth beginning to decay, which ultimately results in inflammation of the part containing the blood vessels and nerves, thus causing toothache and rapid wasting of the tooth structure.

TEGNÉR (tĕng-nâr′), **Esaias,** eminent poet, born in Kyrkerud, Sweden, Nov. 13, 1782; died in Wexiö, Nov. 2, 1846. He attended the public schools in the Vermland province until 1799, when he entered the University of Lund, graduating from that institution as master of arts in 1802. After serving there as tutor until 1810, he became Greek lecturer, and in 1812 was made professor and at the same time was ordained as clergyman of Stafje. His patriotic poem, "Sweden," won the prize at the Swedish Academy in 1811. In 1817 he published "Song to the Sun" and in 1824 completed "Frithiof's Saga, or the Story of Frithiof." He was made bishop of Wexiö in the same year and was a member of the national diet, representing the clerical party. His speeches and orations in connection with national legislation and public policy have a high repute in Sweden and Norway, many of them dealing with finance, literature, industrial development, and education. In 1840 he was stricken with temporary insanity at Stockholm, but, after taking treatment at an asylum in Schleswig, he recovered in 1841 and afterward wrote a number of productions. Among his writings not named above are "Iduna;" "Axel," a romantic poem; and "Kron Bruden," an epical poem. "Frithiof's Saga" has been widely translated, a well-known translation of it into English being made by Longfellow. His "The Children of the Lord's Supper" is a fine work relating to moral practice.

TEGUCIGALPA (tā-gōō-sē-gäl′pä), the capital of Honduras, on the Choluteca River, about forty miles northeast of the Gulf of Fonseca. It occupies a site 3,375 feet above sea level and is surrounded by a fertile region, which has deposits of gold and silver. Among the most important buildings are the cathedral, a national university, several public schools, the government buildings, and a ladies' seminary. It has manufactures of clothing, machinery, and ironware. The city has a brisk inland trade. It was founded by the Aztecs and had some importance in the early history of Central America. Population, 1922, 28,645.

TEHERAN (tĕ-h'rän′), or **Tehran,** the capital of Persia, in the province of Teheran, 68 miles south of the Caspian Sea. The city is located on the southwestern slope of the Elburz Mountains, in sight of Mount Demavend, height 18,600 feet. It was long an inactive and poorly built city, but within recent years material im-

provements have been effected. The facilities include gas and electric lighting, street pavements, rapid transit, and a railroad line. In the older parts the streets are still narrow and irregular, and many of the houses are low and plastered with mud. Among the principal buildings are the citadel-palace of the Shah, the arsenal, numerous bazaars, and the residences of foreign legations. Many beautiful parks adorn the public places, particularly the royal residences and the castle occupied by the kajars. Other features include the Mosque of Masjid-i-Shah and many public baths. The manufactures include linen goods, hats, clothing, carpets, shoes, and machinery. It has a considerable trade in live stock, fruits, cereals, and merchandise. The climate is exceedingly hot in the summer time, causing fully a third of the inhabitants to occupy villas in the highlands toward the north. Near the city are ruins of the ancient Rei, known in the time of Alexander the Great as Ragae, which is regarded the birthplace of Harun-al-Raschid. Population, 1922, 278,608.

TEHUANTEPEC (tā-wän-tā-pĕk'), a town in Mexico, in the state of Oaxaca, fourteen miles from the Gulf of Tehuantepec. It is situated on the Tehuantepec River, which supplies water power, and has railroad connections with the Pacific and the Gulf of Campeachy. The region lying between the Gulf of Campeachy and the Gulf of Tehuantepec, an inlet from the Pacific, is known as the Isthmus of Tehuantepec and forms the narrowest part of North America, lying north of the Isthmus of Panama. It is 130 miles at the narrowest place. Several plans to construct a canal have been projected, utilizing the Coatzacoalcos River a part of the distance, but the project has been abandoned and a railroad line is now operated in its stead, thus supplying valuable transportation facilities between the Atlantic and the Pacific. The town of Tehuantepec has manufactures of indigo, salt, cotton fabrics, and machinery. Off the coast are valuable fisheries, including those of pearl fishing. It has a growing trade in cereals, live stock, and manufactures. Cochineal, fruits, cereals, and grasses are produced in the vicinity. The place was occupied by the Zapotec Indians at the time of the Spanish Conquest, but was captured by Alvarado in 1522. Population, 1922, 12,865.

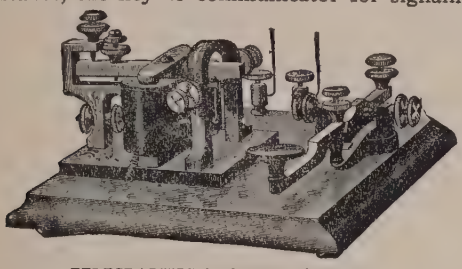
TEKELI (tĕk'ĕ-lĭ), or **Tököly, Emeric, Count of,** eminent soldier and patriot, born in the county of Zips, Hungary, in 1656; died in Constantinople in 1705. He descended from a noble Lutheran family, receiving a liberal education, but the prominent part taken by his father in an endeavor to liberate Hungary from Austrian rule forced him to seek safety in Poland. The Austrian government confiscated his large estates in Holland, and, failing to get a peaceable settlement, he secured aid from the Prince of Transylvania and invaded Hungary with 20,000 men. The first battles in 1678 caused large numbers of Hungarians to join his army, thus enabling him to invade Austria, and in 1681 he compelled Leopold I. to grant concessions to the insurgents. Subsequently he secured support from Turkey and carried forward his former design of attaining the independence of Hungary. The markgraf of Baden defeated the Turks at Salankeman, or Slankamen, in 1691, and the latter sustained an overwhelming defeat at Zenta in 1697, thus compelling them to withdraw their support given to the Hungarians. Count Tekeli was soon after expelled from Hungarian territory and spent the remainder of his life in retirement in Turkey, being reduced to extreme poverty.

TELAUTOGRAPH (tĕl-ą'tŏ-grȧf), an instrument for reproducing by an electric current at a distance sketches and handwriting. The principal part consists of a transmitter and a receiver at each station, and the mechanism is so arranged that electrical current sent over the connecting wires puts the receiving pen in synchronous movement with the transmitting pencil. Two lines of wire connect the transmitters and receivers of other stations, and power equal to that used in two ordinary incandescent lamps is taken from the electric circuit at each end. An ordinary lead pencil is used in the writing or drawing, but two silk threads are attached near its point to make the connection with the transmitter. The impulse is carried by means of the electric current to the receiving station, where the writing or drawing is reproduced in exact agreement with the copy made at the transmitting station. This instrument was invented by Elisha Gray. It is used for the conveyance of messages, in the coast defense service, on warships of the navy, for train dispatching, and in communicating between the news and press rooms of newspaper offices. It may be employed to good advantage in commercial work, since both the sender and the person addressed will have a record. No current is consumed when the transmitter is switched off. It is not necessary for an operator to be at a receiving station, since the writing is done true to the copy when the receiving pencil or pen is in place.

TELEGRAPH (tĕl'ĕ-grȧf), an instrument to send messages by means of electricity, either at short or long distances. An instrument of this kind is frequently called the electric telegraph. The name telegraph is from the Latin *tela* = far, and *graph* = to write, meaning *to write afar.* This term was first applied because the original receiving telegraphic instrument had an electro-magnetic register, which recorded on a band of paper, in the form of dots and dashes, the signals sent over the line of wire. It was soon found that the operator could receive the telegraphic message by sound, even more readily than by the recorded dots and dashes received on the moving band of paper. This led to the

invention of a form of receiving instrument called the *telegraphic sounder,* which is now in almost universal use, though the instrument has been materially improved by successive inventors.

Electro-Magnetic Telegraph. Several essential and complicated parts enter into the electro-magnetic telegraph. These include the battery, or source of electric power, the insulated wire by which the electric current is carried to any distance, the key or communicator for signaling



TELEGRAPHIC RECEIVER AND KEY.

between two places, and the sounder for receiving the messages at the station to which they are sent. A single wire is used to connect the two stations and is joined at each station to a key, a sounder, and a battery. It is necessary to have a complete circuit. This is secured by one pole of each battery being connected with the ground, and, when a current is sent along the wire, the circuit is completed through the earth. The circuit is said to be *broken,* or *open,* when the flow of electricity is cut off and *closed,* when it is allowed to go on again. In sending a dispatch the circuit is opened and closed successively by the operator who sends the message, by means of the key. The armature of the relay at the station where the message is received vibrates in unison with these movements, the sounder repeats them with greater force, and the second operator interprets their meaning.

In long telegraphic lines, when the current reaches the distant end of the line, it is too weak to produce an audible signal, or to form a satisfactory record. In such case an apparatus called a *telegraphic relay* is employed. This consists of an electro-magnet whose magnetizing coils contain many turns of fine wire. The armature of the relay magnet serves to open and close the circuit of a local battery, the current of which operates either the sounder or the recording apparatus. It is possible by means of the relay to send telegraphic dispatches across a continent or ocean. Multitudes of applications have been made of the electro-magnetic telegraph, including the *duplex telegraph,* by which it is possible to send several messages at the same time over a single wire. In this system different sets of instruments are attached to the wire, each set corresponding to currents of different strength and being in communication with special batteries. Messages can be transmitted in this way without interruption for the reason that the instruments respond only to the batteries to which they are attached.

Many improvements have been made in the construction of telegraphic instruments, and extensive systems of wire lines are maintained in practically all countries. The Edison-Smith system of *train telegraphy* is one of the newer devices. By means of it a train in motion may receive dispatches from offices along the line, this being effected by induction from the telegraph wires along the line of railway and the communication is received by an instrument located in one of the cars. William Marconi, Nikola Tesla, and a number of other inventors added largely to telegraphic advancement by constructing instruments to communicate messages without wires, this system being known as *wireless telegraphy.* Another system, known as the *Bonelli's telegraph,* employs five wires and the messages are set up in brass type. However, it is too expensive to make it practical in commercial telegraphy.

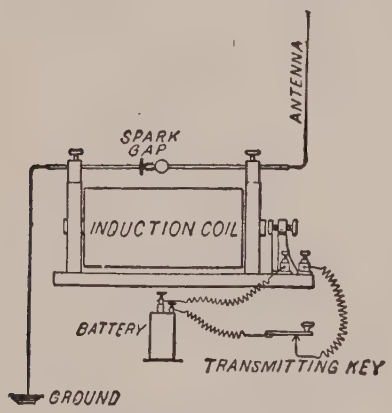
Telegraph Lines. Telegraph wires are usually stretched upon high poles, but in some countries they are covered with a nonconductor, usually gutta-percha, and buried in the ground. A bracket is used to furnish ample facilities to attach the wires, but where from eight to twenty wires are employed in the same system two or more brackets are necessary. The attachment is made by means of glass knobs, since glass is a good nonconductor and prevents the escape of the current at the poles. Telegraph lines in Canada and the United States are owned by private corporations, who send messages for individuals at certain toll rates, but in most European countries the telegraph lines are operated by the government in connection with the postal system, thus giving the people a popular and efficient means of communication at low rates.

History. Practical efforts to send messages by the agency of electricity date from the early part of the 18th century, though the idea of using electric currents for that purpose is much older and was alluded to by writers of ancient times. The first practical results were obtained by stretching a series of wires and suspending from the ends a number of light balls marked with the letters of the alphabet, the electric current moving the particular ball against which it was directed. Such an instrument was perfected at Geneva, Switzerland, by Le Sage in 1774. Steinheil, of Munich, Germany, invented an electro-magnetic machine, in 1837, and Cook and Wheatstone, two Englishmen, in the same year secured a patent for a constant battery instrument. In the latter a keyboard was employed and needles were adjusted so as to point to the different letters under the proper impulse. Professor Morse is the inventor of the present commercial system of telegraphy. He constructed the first line over which a message was sent successfully at a long distance, the line

being from Washington to Baltimore. The first message was, "What hath God wrought?" and was sent by him in 1843 to his assistant, Alfred Vail. The sum of $30,000 was appropriated by the United States government to successfully develop and apply the instrument.

The United States has the largest mileage of telegraph poles in the world, a total of 246,540 miles. These are controlled principally by two companies, the Western Union and the Postal Telegraph, the former having about 75 per cent. of the lines. Canada has an efficient telegraph service, a total of 48,775 miles, including several transcontinental lines. Russia has 105,800 miles; France, 93,600; Germany, 90,000; Australia, 50,000; Great Britain, 48,500; and Mexico, 36,000. See **Cables; Telautograph.**

TELEGRAPHY (tĕ-lĕg′rȧ-fy), **Wireless,** the art of telegraphing by electricity without wires. In theory it is closely allied to heliography, or signaling with flashes of light. The



WIRELESS TRANSMITTER.

light used is produced by electricity and is made up of very long waves, called *Hertzian waves,* and is invisible to the naked eye, since the waves vibrate too slowly to affect the retina. The waves were named from the discoverer, Heinrich Hertz (1857-1894), a German physicist, who conducted experiments with spark discharges of the Ruhmkorff coil and Leyden jars in the period extending from 1886 to 1887. He found that when a spark leaped the gap between the terminals there were electric oscillations in these terminals sufficiently strong to produce magnetic waves in the surrounding space, which in turn caused similar oscillations in an adjacent conductor lying at an angle to them. The waves were detected by a device called a *resonator,* which consists of a circle of copper wire formed with a gap. The transmitter employed by Hertz was practically the same as is used at present, but the receiver has been greatly improved.

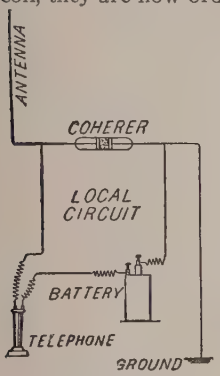
Systems. William Marconi, an Italian inventor, developed the pioneer system of wireless telegraphy by utilizing the discovery of Hertz. The first wireless message was sent across the English channel in 1899, a system having been established in England by Marconi, and the first daily newspaper published on mid-ocean was issued Nov. 15, 1899, on board the steamer *Saint Paul,* containing news transmitted from shore by wireless telegraphy. Many systems are now in use, those employed chiefly in North America being the Marconi, Fessenden, and De Forest systems. The Popoff system is used most in Russia; the Slaby-Arco and Braun-Siemens-Halske, in Germany; the Fissot, Branley, and Rochefort, in France; and the Marconi, Lodge-Muirhead, and Orling-Armstrong, in England. In 1903 the government of Italy voted $160,000 to establish a transatlantic system of wireless telegraphy. Wireless outfits are carried by all modern warships and by many steamships. The advantages of wireless communication were greatly emphasized in the naval operations during the Russo-Japanese War and at numerous times while the Revolution of 1905 was raging in Russia. Intelligible messages were sent as early as 1901 from Cornwall, England, to Newfoundland, a distance of 1,800 miles.

Apparatus. The accompanying illustrations give a fairly clear idea of the mechanical construction of the instruments employed. In typical wireless telegraph stations, both transmitting and receiving, the vertical wire, called the *antenna,* is mounted on a tower about 100 feet high. Frequently a series of wires is used. In some instruments the receiver is supplied with a telephone, while others transmit the sound in the manner of an ordinary telegraph, or record the messages in telegraphic characters.

Messages are transmitted by operating a telegraph key according to the Morse code in the primary circuit of the induction coil (see transmitting key), which causes sparks to leap at corresponding intervals at the spark gap. (See illustration.) Signals induced in this way are transmitted by the Hertzian waves to the receiving station, where the telegraph receiver records them, or they may be perceived by holding the telephone to the ear (see illustration), though in most instruments the Morse alphabet, made by combinations of long and short signals, is utilized through the agency of a recorder or receiver. Much improvement was made by Marconi when he increased the sensitiveness of the coherer, but there are in use many types of wave detectors, though they are all based largely on the principle of the imperfect contact, the Marconi magnetic detector being an exception. Inventors are still at work in an effort to develop a system which will not allow interference between two or more equipments. Such a system is quite essential, since it would prevent unauthorized persons from reading and intercepting the messages. The purpose is to tune or syntonize the transmitting and receiving stations with the view of perfecting instruments that will give and respond to oscillations of a certain periodicity only. Although many patents have

been granted to inventors who claim to have made improvements so the desired result can be secured, complete success in syntonizing had not been obtained up to 1909.

In order to better understand the mechanical parts of equipment for wireless telegraphy, the following is given with the suggestion that it covers the essentials of most instruments: A vertical wire called the *antenna* is connected to one terminal of the coil, and the other terminal is connected with the earth, the purpose being to increase the electrical capacity of the terminal rods and produce larger waves. Instead of producing the oscillations by means of an induction coil, they are now ordinarily produced by a dynamo and a step-up transformer, except for telegraphing over short distances. But even with these changes we would not be able to telegraph over any appreciable distance if dependent upon the Hertz resonator for receiving a message, for, owing to the fact that the waves spread out in all directions from the transmitting antenna, the receiving antenna is acted upon by a very small proportion of the power expended by the transmitter, and this proportion decreases very rapidly as the distance between the transmitter and the receiver increases. In order, then, to detect the rays at long distances, a very sensitive instrument called the *coherer* has been invented.

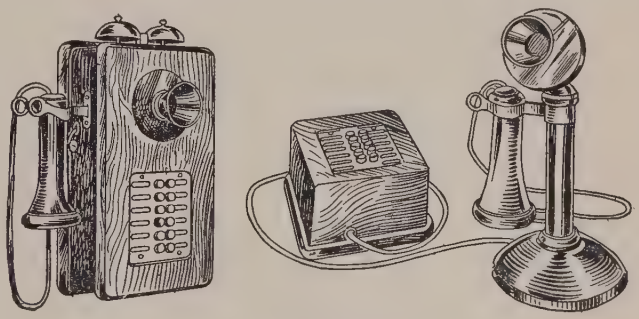


WIRELESS RECEIVER.

The coherer in its usual form consists of a glass tube with two metal pistons fitted therein between which a quantity of nickel filings is placed. The latter form an imperfect electrical contact between the pistons, and take the place of the spark gap in the receiving antenna. When the oscillations are set up in the antenna by the Hertzian waves, due to their high pressure or voltage, they break through the imperfect contact of the coherer, causing the filings therein to cohere or string together and thus produce a much better electrical path through the coherer. The action is microscopic and cannot be detected with the naked eye. However, the coherer, aside from being a part of the antenna circuit, is also made a part of a local battery circuit, which contains a telegraph receiver, and, whenever the electric oscillations open a good path through the filings for the local circuit, the telegraph instrument will be energized by the local battery only. In order to break this path after the oscillations have ceased, or, in other words, to cause the filings to decohere, they are constantly jarred apart by means of the tapper, which is in reality an electric bell with the gong removed, the clapper striking the coherer tube instead. Carbon granules may be substituted for metallic filings, and in this case no tapper is necessary, the coherer being self-restoring.

TELEMACHUS (tĕ-lĕm'ă-kŭs), in Greek mythology, the son of Ulysses and Penelope. He was an infant at the beginning of the Trojan War and was left in charge of Mentor, a trusted friend of Ulysses. After the close of the war, he was accompanied by Mentor in search of his father, whom they found as a beggar at the hut of a swineherd in Ithaca. After the identity of Ulysses was made known to the son, they formulated a plan to slay the insolent suitors of his mother, Penelope. After some of the insolent suitors had been slain and others were driven from the place, the surviving suitors conspired to kill the youth, but he was enabled to escape through the aid of Minerva. It is related that he afterward removed to the island of Aeaea, where he married Circe, the fabled sorceress.

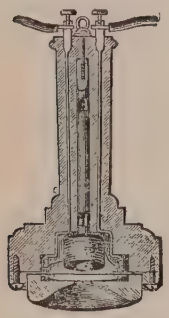
TELEPHONE (tĕl'ĕ-fōn), an instrument for reproducing sound at a distance by the transmission of impulses through the agency of electricity over a conducting wire or cord. The three essential parts of a telephone include the *transmitter,* by which sound waves generate or modify an electric current; the *line,* by which the current is transmitted to the distant station; and the *receiver,* through which the current produces sound waves. In the common form of the telephone a transmitting and a receiving instrument are employed at each end of the line. A strong bar magnet, provided with a coil of insulated wire wrapped around it near one end, is connected at one of its ends to a wire which passes to a distant station, where it is connected to one end of a similar cord wrapped around a magnet of the same kind. The other end of the insulated wire is connected with the ground, thus providing a complete circuit, called a *telephone circuit.* A thin disc of sheet iron is fixed


TELEPHONES.

Wall Type. Desk Type.

in front of the extremity of the magnet. As the mouthpiece of the transmitting instrument collects and concentrates the sound, the sheet iron is caused to vibrate, and electric currents corresponding exactly to the original sounds are thereby excited. A person holding the receiver to the ear at the other end of the line is enabled to perceive a reproduction of the original sounds, for the reason that the electric currents, coming against the plate or disc in the receiving telephone, produce corresponding vibrations. The reproduction is so true that the voice of the speaker can be readily recognized at a distance of many hundred miles. In the accompanying figure a sectional view of the telephone is shown.

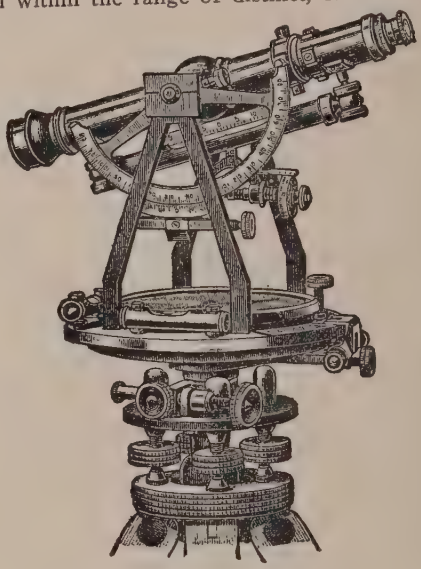
The ancients understood the laws on which the telephone is based, but the invention of practical instruments to successfully utilize them in long-distance communication dates from the 19th century. Philip Reis, of Friedrichsdorf, Germany, constructed a telephone in 1861 and was the first to apply the name by which it is known. This he did before the Physical Society of Frankfort. Elisha Gray, of Chicago, completed a short distance telephone in 1873. However, Alexander G. Bell, of Boston, Mass., was the first to invent a telephone that carried the human voice with perfection a long distance. He exhibited his instrument in 1876. Shortly after, Thomas A. Edison and others made notable improvements. The telephone came into general use with remarkable rapidity, not only in cities and towns, but it is in extensive use in country districts. In 1920 the wireless telephone or radio was greatly improved, enabling the operators on standard instruments to send messages unlimited distances without the use of wires.



SECTION VIEW OF TELEPHONE.

The systems of telephones now in use enable people in cities and many in rural districts to communicate with each other, thus greatly facilitating rapidity and convenience in social and business communication. Long-distance telephones are likewise numerous. The first line of material length was completed, in 1895, between New York and Chicago, which is about 950 miles. Long distance lines are maintained between Paris and London, between Paris and Berlin, between Berlin and Vienna, and between many other capitals and cities of Europe. Michael I. Pupin, of Columbia University, in 1891 announced the invention of a device for overcoming the resistance long experienced in ocean telephoning. He placed at regular intervals along his cable an induction coil around the parent wire. The current, which can be very weak, starts from the remitter, and just as it begins slightly to weaken strikes one of these induction coils, which strengthens the current and gives it renewed impetus, and, so pushed on its way, the current leaps from coil to coil according to well-known electrical laws. Relays serve the same purpose in long-distance telephoning and in telegraphing.

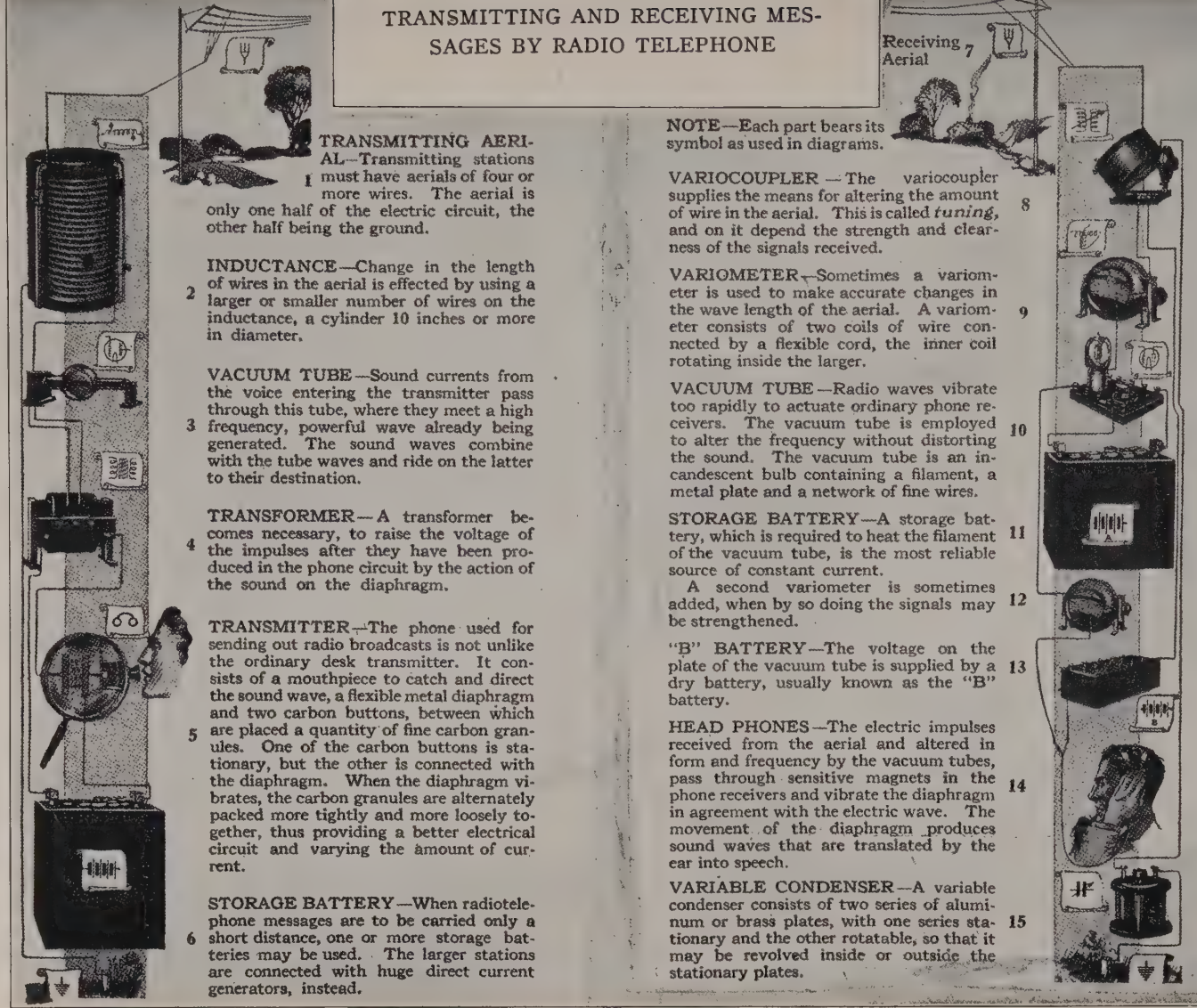
TELESCOPE (tĕl'ĕ-skōp), an optical instrument to magnify distant objects and bring them within the range of distinct, or more distinct, vision. It consists essentially of two parts, an object glass, or mirror, for forming an image of the object, and an ocular, or eyepiece, for receiving the image. The telescope assists the eye in two ways, by magnifying the image of the objects viewed, and by collecting and concentrating upon the eye a greater amount of light than would enter the organ if unassisted. It may be taken as a general rule, that the larger the object glass, the greater in both respects is its power. The object glass is convex, and the eyepiece is either convex or concave. In the former case the image appears inverted, and in the latter case it appears to the eye in its natural position. Eyeglasses are always concave in terrestrial telescopes, as opera glasses and spy glasses, but in astronomical telescopes they may be of either form, since the object to be viewed has a spherical shape. Telescopes are either refracting or reflecting. The former transmit the rays to a focus through a combination of lenses called the *object glass,* while the latter bring them to a focus by reflection from a concave mirror. Thus, an observer looking through the eyeglass of a refracting telescope views the image itself, but one using a reflecting telescope views a reflection of the image made by the mirror.



TELESCOPE MOUNTED FOR USE.

The *reflecting telescopes* have very large object glasses, and to them are due the most important discoveries made in astronomical science. The largest reflecting telescope in the world is that

TRANSMITTING AND RECEIVING MESSAGES BY RADIO TELEPHONE



1 **TRANSMITTING AERIAL**—Transmitting stations must have aerials of four or more wires. The aerial is only one half of the electric circuit, the other half being the ground.

2 **INDUCTANCE**—Change in the length of wires in the aerial is effected by using a larger or smaller number of wires on the inductance, a cylinder 10 inches or more in diameter.

3 **VACUUM TUBE**—Sound currents from the voice entering the transmitter pass through this tube, where they meet a high frequency, powerful wave already being generated. The sound waves combine with the tube waves and ride on the latter to their destination.

4 **TRANSFORMER**—A transformer becomes necessary, to raise the voltage of the impulses after they have been produced in the phone circuit by the action of the sound on the diaphragm.

5 **TRANSMITTER**—The phone used for sending out radio broadcasts is not unlike the ordinary desk transmitter. It consists of a mouthpiece to catch and direct the sound wave, a flexible metal diaphragm and two carbon buttons, between which are placed a quantity of fine carbon granules. One of the carbon buttons is stationary, but the other is connected with the diaphragm. When the diaphragm vibrates, the carbon granules are alternately packed more tightly and more loosely together, thus providing a better electrical circuit and varying the amount of current.

6 **STORAGE BATTERY**—When radiotelephone messages are to be carried only a short distance, one or more storage batteries may be used. The larger stations are connected with huge direct current generators, instead.

NOTE—Each part bears its symbol as used in diagrams.

8 **VARIOCOUPLER**—The variocoupler supplies the means for altering the amount of wire in the aerial. This is called *tuning*, and on it depend the strength and clearness of the signals received.

9 **VARIOMETER**—Sometimes a variometer is used to make accurate changes in the wave length of the aerial. A variometer consists of two coils of wire connected by a flexible cord, the inner coil rotating inside the larger.

10 **VACUUM TUBE**—Radio waves vibrate too rapidly to actuate ordinary phone receivers. The vacuum tube is employed to alter the frequency without distorting the sound. The vacuum tube is an incandescent bulb containing a filament, a metal plate and a network of fine wires.

11 **STORAGE BATTERY**—A storage battery, which is required to heat the filament of the vacuum tube, is the most reliable source of constant current.

12 A second variometer is sometimes added, when by so doing the signals may be strengthened.

13 **"B" BATTERY**—The voltage on the plate of the vacuum tube is supplied by a dry battery, usually known as the "B" battery.

14 **HEAD PHONES**—The electric impulses received from the aerial and altered in form and frequency by the vacuum tubes, pass through sensitive magnets in the phone receivers and vibrate the diaphragm in agreement with the electric wave. The movement of the diaphragm produces sound waves that are translated by the ear into speech.

15 **VARIABLE CONDENSER**—A variable condenser consists of two series of aluminum or brass plates, with one series stationary and the other rotatable, so that it may be revolved inside or outside the stationary plates.

of Lord Rosse at Parsonstown, Ireland, which has a speculum six feet in diameter. Other large instruments of this class include the William Herschel telescope and the one erected by Ainslie A. Common near London. Both of these are smaller than the Rosse instrument, but they are more perfect in their effect. The Lick Observatory in California has a refracting telescope with an object glass three feet in diameter. It was long the largest in the world, but it is surpassed in size by the Yerkes telescope at Lake Geneva, Wisconsin.

The Yerkes telescope belongs to the Chicago University, being a gift of Charles T. Yerkes, and is now the largest in use. Its object glass measures forty inches in diameter, is about three inches thick, and weighs 762 pounds. The sheet-steel tube is 63 feet long, the largest diameter being 53 inches, and the weight of its three sections is six tons. The estimated cost of the lens is $100,000, and of the telescope and the observatory, $500,000. Although the telescope has a power considerably greater than that of the Lick instrument, its location is less favorable on account of being on lower ground, thus giving it a more misty atmosphere. Other noted refracting telescopes include the one at the Washington Naval Observatory, 26 inches; at Vienna, 27 inches; at Yale University, 28 inches; and in Pultova, Russia, 30 inches. Among the men connected with the history and development of the telescope are Gerbert of Auvergne, Roger Bacon, Galileo, Kepler, Liebig, Newton, Herschel, and Peter Andreas Hansen (1795-1874).

TELL, William, celebrated hero and patriot of Switzerland, who, according to historical accounts, rescued his native land from Austrian oppression in the 14th century. He belonged to the canton of Uri, which had joined Schwyz and Unterwalden in a confederacy against Gessler, the resident governor under Austria. The latter was noted for his haughty and tyrannical disposition, and, among other requirements, insisted that all persons passing the market place of Altdorf should remove their hats while opposite a long pole, on which he placed the ducal hat of Austria. Tell and his son, refusing to obey the mandate, were taken before Gessler, who ordered that Tell should shoot an apple from the head of his son, but in the event of missing it the death punishment should be inflicted upon him. This feat he accomplished without injury to the boy, but he had concealed an arrow with which to shoot Gessler, in the event that the apple had been missed or the boy had been injured. He was accordingly imprisoned a second time and conveyed across Lake Lucerne, but on nearing the shore leaped from the boat and escaped, and soon after freed Switzerland by sending an arrow through the heart of Gessler. An extended war between Albert I. of Austria and the Swiss peasants soon followed, hostilities continuing, with intervals of peace, for nearly 200 years, or from 1307 until 1499, when a prolonged peace was concluded. The most prominent battle in which Tell took part is that of Morgarten, in 1315, and it is said that he was drowned in the Schächen River, in 1350, while trying to rescue a friend. Though much attributed in history to Tell appears fabulous, many circumstances indicate that such a man lived and rendered services in securing the independence of Switzerland. Schiller made the story popular by his well-known drama, "William Tell."

TELLER, Henry Moore, public man, born in Allegany County, New York, May 23, 1830. After studying law and practicing in New York, he removed to Illinois in 1850, and in 1861 settled in Colorado. He was elected to the United States Senate in 1876, and in 1882 became Secretary of the Interior under President Arthur. In 1885 he was again elected United States Senator and was reëlected in 1891, in 1897, and in 1903. Teller delivered many able addresses on the floor of the Senate and served on a number of leading committees. He died Feb. 23, 1914.

TELLURIUM (tĕl-lū'rĭ-ŭm), a nonmetallic element belonging to the same class as sulphur and selenium. It occurs native in small quantities and is found in a number of minerals, especially in California, Virginia and Hungary. This element is crystalline, white, and shining, and burns with a strong flame. The flame is blue with green edges, and while burning it gives off a thick white smoke. See **Chemistry.**

TEMISKAMING, or **Temiscaminque,** a lake of Canada, on the border between Ontario and Quebec. It is 80 miles long and is well stocked with edible fish. The Ottawa River flows through this lake.

TEMPE, a narrow valley in northern Greece, through which flows the Peneus River. It is situated between Mount Olympus and Mount Ossa, in Thessaly. Both ancient and modern poets have praised its beautiful and romantic scenery, and tourists speak of it as a region of remarkable grandeur. In places the valley narrows so as to leave passage only for the river and a carriage road, and in several localities are ruins of ancient castles and fortresses.

TEMPERANCE. See **Total Abstinence.**

TEMPERANCE (tĕm'pĕr-ans), **Sons of,** an organization to promote temperance, founded in New York in 1842. Both men and women are eligible to membership, and a cadet branch is maintained for boys who are not under sixteen years of age, who are designated as Cadets of Temperance. Those who join are required to sign a pledge not to use alcoholic drinks or engage in the sale or manufacture of spirituous liquors. The order has branches in Australia, Canada, Great Britain, and the United States. About half of the members are in the last mentioned country, where a membership of 3,000,000 is reported. This organization has life insurance and sick and funeral benefits.

TEMPERATURE (tĕm'pĕr-à-tûr). See **Thermometer.**

TEMPERATURE, the condition of any body with regard to heat or cold. *Animal temperature* has reference to the state of the body of animals with regard to heat, though this applies only to warm-blooded species during life. The source of heat in animals is found in the potential energy of the food and the oxygen which is absorbed from the air during respiration. In the healthy human adult the temperature ranges from 97.5° to 99° Fahr., and the normal state is usually close to 98°. In early infancy as well as in old age, the temperature is slightly above the average, but it is influenced but slightly by race, though the people who reside in the tropical regions have a temperature averaging about one-half a degree higher than those of the Temperate zones. At the surface the body is slightly cooler than in the interior, and it is somewhat higher immediately after meals and during exercise. In fevers the temperature rises to 106°, and registrations below 93° and above 106° are usually fatal. When the body has a temperature of 100°, the pulse beats 80 times per minute. See **Climate.**

TEMPERING, the process of producing a determined degree of hardness in metals, especially iron and steel. Hardness is that property by which certain substances resist being worn or scratched by others. However, the terms *hard* and *soft* are used only in a relative sense, since a body may be hard as compared with one substance, but soft when compared with another. Thus, glass is considered hard when compared with marble, but it is soft as compared with the diamond, since it is scratched or cut by the diamond. Steel possesses the property of being easily hardened or tempered, and it is possible to obtain almost any degree of hardness and brittleness in this metal. The process consists in plunging the steel, when raised to a red heat, into cold water or some other liquid, which will cause it to become hard. To temper it properly for the purpose desired, as in making knives and razors, it may be made excessively hard and then reduced by gradually reheating. Hardness in steel is indicated by its color. Razors and surgical instruments are made from steel heated to about 450° and then plunged into cold water or oil, when it assumes a pale straw color.

TEMPLARS (tĕm′plērz), or **Knights Templar,** an order of knights founded at Jerusalem in the beginning of the 12th century, celebrated alike for its religious and military influence. Nine Christian knights were the founders, of whom the chief ones were Hugues de Payens and Geoffrey de Saint Omar, and the object was to protect the Holy Sepulcher and its visitors. Baldwin II., King of Jerusalem, accommodated them by allowing them to occupy a part of his palace, and the abbot and canons of the church and convent of the temple gave them a building wherein to keep their arms, whence they were called *Templars.* The order was confirmed in 1128 by Pope Honorius II. They were enjoined to wear a red cross on the left breast and on their banners by Eugenius III., in 1146. The Templars exercised a wide influence in Palestine until Jerusalem was captured by the Saracens in 1187, when they retired to Antioch, then to Acre, and finally transferred their seat to the island of Cyprus. Pope Alexander III. had already conferred extensive privileges upon the order in 1162, which included regulations that gradually increased their numbers, and they became very numerous in all the countries of Southern and Western Europe, establishing themselves in England about 1185.

The Templars gradually attained to great wealth and influence, including some of the leading families of Europe, and at one time had designs upon European thrones, with the view of establishing a nationality. Philip the Fair of France lured Jacques D. Molay, master of the temple, to Paris in 1306 with the view of suppressing the order in France, and the following year placed all the leaders under arrest. Pope Clement V. issued a bull calling upon Christian princes to aid in examining the Templars as to piety and morality, and a general council at Vienna, in 1311, abolished the order as heretical. Many of the leaders were prosecuted and put to death for alleged crimes, while their wealth was confiscated and their meetings were prohibited. In France the treatment accorded the Templars was highly unjust, and they were served no better in England under Edward II. They received just and mild treatment in Germany, where they maintained themselves longest. Much of the property belonging to the Templars was bestowed on the order of the Knights of Saint John, which was joined by many of the members after the main organization had been abandoned.

TEMPLE, a building designed for religious worship. In some countries the term is used synonymously with church and even with mosque, but it has special reference to the chief sanctuary of the Jews, the Christian churches constructed by the Knights Templar, the Protestant places of worship in France, and the edifices erected in various pagan countries. Solomon, King of the Jews, built the most remarkable temple in the historic period of the world. It was located on Mount Moriah, in Jerusalem, and was constructed of stone and the cedar of Lebanon. The length was 60 cubits; the width, 20 cubits; and the height, 30 cubits. It was divided into two parts, the outer sanctuary or Holy Place, and the Holy of Holies; the former was 20 by 40 and the latter 20 by 20 cubits. Within the Holy Place were the showbread table, the altar of incense, the seven-branched candlesticks, and ten smaller tables and candlesticks. The Holy of Holies contained the Ark of Testimony, sheltered by the outspread wings of two cherubs. Nebuchadnezzar destroyed the temple in 586 B. C., but the Jews erected a new edifice on the same site after returning from the Babylonian captivity, in 516 B. C. It was rebuilt by

RUINS OF THE TEMPLE OF ISIS ON THE ISLAND OF PHILAE, EGYPT.

Notice that the River Nile surrounds the island.

Herod the Great in 18 B. C., and his structure was the one from which Christ expelled the merchants and money changers. It remained intact until 70 A. D., when it was completely destroyed by the Romans. In the time of Constantine the Jews sought to rebuild the temple on the same site, and another attempt was made by Julian, but both attempts proved futile. The ground is now occupied by a Moslem place of worship, known as the Mosque of Omar.

Temples were very common in Greece and Rome. They were dedicated to some particular deity and in them the priests officiated and burned incense. Indeed, these edifices were the principal architectural features of most ancient peoples. Many of the ruins in Egypt, Greece, Rome, and even China give evidence that these structures were of large size and contained the greatest treasures of ancient civilizations. Temples of considerable note are found in China and other countries of Asia, and in form they do not differ materially from the ancient style. See **Pagoda.**

TEMPLE, a city of Texas, in Bell County, about 112 miles south of Fort Worth, on the Missouri, Kansas and Texas and the Gulf, Colorado and Santa Fé railroads. The surrounding country is fertile. The features include the public library, the high school, an academy, two hospitals, and extensive railroad shops. Among the manufactures are cotton textiles, earthenware, cigars, clothing, and machinery. It is a market for cereals, live stock, dairy products, and merchandise. Electric lighting, pavements, waterworks, and sewerage are among the improvements. It was settled in 1881. Population, 1900, 7,065; in 1920, 11,033.

TEMPLE, Frederick, Archbishop of Canterbury, born at Leukas, in the Ionian Islands, Nov. 30, 1821; died Dec. 23, 1902. He was educated at Baliol College, Oxford, and in 1846 was ordained for the ministry. In 1848 he was made principal of the training college at Kneller Hall and became head master at Rugby in 1855, where he administered successfully for eleven years. He was appointed bishop of Exeter in 1869, bishop of London in 1885, and Archbishop of Canterbury in 1896, and the following year wrote a learned and dignified reply to the papal decision that declared invalid the ordination of the Church of England. In 1901 he officiated at the coronation of Edward VII. His publications include "Reviews and Essays," "Sermons Preached at Rugby Chapel," and "Relation Between Science and Religion."

TENACITY (tē-năs'ĭ-tў), the power of a substance to resist being pulled apart. It is due to the cohesion of the molecules, hence tenacity varies greatly in different substances. The length of a bar or beam does not affect the number of molecules in the area of a given cross section. However, a long beam is likely to have a flaw or weak spot, hence it may be less tenacious than a short beam, since it inclines to break at its weakest part. Wood is more tenacious in the direction of its fibers than in the transverse direction, while metals usually have greater tenacity in the longitudinal direction. In most cases the simple metals have less tenacity than those which are mixed.

TENANT (tĕn'ant), one who holds or possesses real estate temporarily, the title of which is vested in another, who is known as the *landlord.* Such an occupant usually has possession under the terms of a lease, whereby the relation of the landlord and tenant is created. If an occupant has possession on no fixed terms, though with the will and knowledge of the landlord, he is said to be a *tenant at will.* Where two or more persons have possession of lands or tenements, each is called a *tenant in common.* The term *tenant for life* is applied to one whose possession is dependent upon his own life or that of another.

TENCH, the name of a fish of the carp family, found in the fresh waters of Europe and Asia. It is soft-rayed, rarely is more than 14 inches long, and has a yellowish-brown color. The tench prefers stagnant waters with a muddy bottom, and the winter is spent in a torpid state in the mud. It is tenacious of life and its flesh is not prized as a food.

TENDER (tĕn'dĕr), an offer to do an act which one person is legally bound to perform for another. The obligation as well as the offer may be to pay money or to deliver special articles. If the tender be of money, it is effectual only when the demand is one of money and the amount tendered is adequate. When a person makes a tender of lawful money to discharge a debt, it is termed a *legal tender.* Usually the law specifies what constitutes a legal tender. Silver coins in denominations of less than one dollar constitute a legal tender for ten dollars or less in the United States. Silver coins in the denomination of one dollar and all classes of gold coin are legal tender for any amount, which is true also of United States bank notes. However, bank notes are legal tender only for private debts and certain other debts, but not in payment of interest on the public debt or as duties on imports.

TENDON (tĕn'dŭn), in anatomy, white fibrous tissue which connects the end of a muscle with the bone that it is intended to move. Some tendons are formed like a broad ribbon, others are cylindrical, and still others are thin like a sheet. A tendon is not elastic nor extensible, and thus transfers immediately the motion imparted by the contraction of the muscle to the bone into which it is inserted. In many cases the tendons are long and slender, as those extending from the muscle in the upper part of the forearm to the fingers.

TENERIFFE (tĕn-ĕr-ĭf'), an island of the Canary group, one of the largest and most productive. It is situated about 150 miles northwest of Cape Bojadór, Africa. The contour resem-

bles that of a triangle, with the two longest sides sixty miles long and the western side about twenty miles. The area is given at 785 square miles. Most of the coasts are high and characterized by deep inlets, and the surface is diversified by plains, valleys, and mountains. The highest elevations are from 8,000 to 12,000 feet above the sea, Mount Teneriffe being the culminating summit. The island is volcanic and vapors rise constantly from some of the craters. Among the chief products are nuts, cochineal, cereals, silk, grasses, and fruits. Live stock, such as horses and cattle, is grown successfully. The island belongs to Spain, with which country it has a considerable commerce. Santa Cruz and Laguna are the chief seaports. Population, 1922, 137,620.

TENIERS (tĕn'yĕrz), **David,** called the younger, eminent painter, born in Antwerp, Holland, in 1610; died Feb. 11, 1690. He was a son of David Teniers (1582-1649), an eminent Flemish painter, under whom he received instruction in drawing and painting. Later he studied under Adrian Brouwer. He is considered superior to his father as a painter of scenes and incidents in rural life, and is noted for his success in historical and landscape painting. Among the distinguished personages patronizing him were Queen Christina of Sweden, Don John of Austria, Archduke Leopold, and the Prince of Orange. His paintings are very numerous, including fully 1,000, and many take high rank for their trueness to nature, artistic coloring, and exactness in execution. A group of ladies and gentlemen painted by him in 1630 is in the Berlin Museum. Other paintings of note are in the Munich Gallery, the Brussels Museum, and the Gallery in Saint Petersburg. Among the most noted of his paintings are "The Prodigal Son," "The Five Senses," "The Village Wedding," "The Bagpipe Player," "Jubilee Meeting of the Civic Guards," and "Heron Shooting."

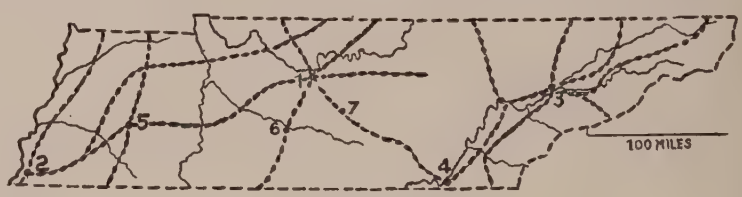
TENKATE (tĕn-kä'tę), or **Kate, Jan Jacob Lodewijk,** poet and clergyman, born at The Hague, Holland, Dec. 23, 1819; died in 1889. He first studied in his native city and afterward took a course in theology at the University of Utrecht, receiving a ministerial charge on the Marquesas Islands in 1845. In 1847 he settled in Amsterdam, where he exercised an extensive influence both as pastor and poetical writer. His poetical writings are numerous, including three collections, entitled "Roses," "Flowers," and "Poesie." "Italian Travels" is a work in prose. He translated Milton's "Paradise Lost," Thomson's "Seasons," La Fontaine's "Fables," and the "Book of Job."

TENNESSEE (tĕn-nĕs-sē'), a southern State of the United States, the third to be admitted after the adoption of the Constitution, popularly called the *Big Bend State.* It is bounded on the north by Kentucky and Virginia, east by North Carolina, south by Georgia, Alabama, and Mississippi, and west by Arkansas and Missouri. The length from east to west is 432 miles, and the greatest width is 109 miles. It has an area of 42,050 square miles.

DESCRIPTION. The flood plain of the Mississippi is located in the western part of the State, and between it and the narrow valley of the Tennessee is an extensive ridge running north and south, which is diversified by fertile valleys and plains. Between the Tennessee Valley and the Cumberland Mountains, in the eastern part, is a valley region about 100 miles wide, whose surface is of a gently undulating character, with small elevations in many places The Cumberland Mountains range about 1,000 feet above the Tennessee River, and between them and the Chaka and Smoky mountains is a valley more or less diversified by minor elevations, including ranges of the Unaka, Bald, and Stone mountains. This region contains many caverns and numerous subterranean streams. The Smoky Mountains have a general elevation of 5,000 feet, but many of the peaks are much higher. Klingman's Dome, height 6,663 feet, is the highest summit in the State.

The drainage belongs entirely to the Mississippi system, but the only rivers of considerable size that discharge directly into the Mississippi are the Obion and the Big Hatchie. These flow in a general direction toward the west, where the Mississippi forms the entire western boundary, while the Ohio forms all of the northern border. The Cumberland enters the State from Kentucky and flows toward the southwest until it passes Nashville, when it recrosses the Kentucky border in Stewart County. The Tennessee River is formed in the eastern part of the State by the Clinch and Holston rivers, both of which rise in Virginia, and crosses the southern border into Alabama and Mississippi, but reënters the State in Hardin County and flows across it into Kentucky. The French Broad is a tributary of the Holston River, which it enters a short distance above Knoxville. No lakes of material size are within the State, except the lagoons in the Mississippi flood plain. These include Reelfoot Lake, which is 5 miles wide and 25 miles long.

The climate is mild and favorable, but varies



TENNESSEE.

1, Nashville; 2, Memphis; 3, Knoxville; 4, Chattanooga; 5, Jackson; 6, Columbia; 7, Murfreesboro. Chief railroads shown by dotted lines.

considerably on account of differences in altitude. In the western lowlands it is less healthful than in the remainder of the State. The mean temperature for July is 77° and for January 38°. While the thermometer falls below zero in the mountains, the minimum in the State generally is seldom lower than 10°, and the maximum is about 104°. Chattanooga has a mean temperature of 59°. Rainfall is abundant in all parts of the State, ranging from 47 inches in the eastern to 50 inches in the western section, but it frequently reaches 60 inches in some localities of the central part.

MINING. The State has extensive mineral resources and the output of various minerals has grown constantly the past decade. Coal is mined in the counties lying west of the upper Tennessee River, and the annual yield is about 4,850,000 tons. In the output of iron ore, the State holds sixth rank. Phosphate rock is obtained in large quantities in the north central part of the State, in the vicinity of Nashville. There has been a constant increase in the output of copper Building stone, such as granite and limestone, is quarried in many parts of the State for building purposes. Mineral waters, glass sand, and commercial clays are widely distributed. Other minerals include zinc, petroleum, natural gas, and mineral paints.

AGRICULTURE. Farming is the chief occupation. The farms average ninety acres, about one-seventh of which are operated by Negroes. The Cumberland plateau is not well suited for agriculture, but all other parts of the State possess fertility, especially the rich alluvial lands of the Mississippi bottom. Corn is grown on a larger acreage than any other cereals, and in the yield of this crop the State usually holds 12th rank. Wheat is the second crop in acreage and is followed in order by hay, cotton, and oats. Other important crops include tobacco, peas, potatoes, peanuts, rye, sweet potatoes, and sorghum. Fruit culture is the source of a large income, especially apples, strawberries, peaches, pears, and watermelons. Large interests are vested in the live-stock industry, especially in cattle and swine. Special attention is given to the rearing of fine grades of horses and mules, and sheep and poultry are represented in large numbers. More than one-third of the cattle are reared for dairy purposes.

MANUFACTURING. The progress in manufacturing enterprises has been very noticeable the past ten years, both in the quantity and variety of the output. The State is well supplied with commercial timber, such as hickory, beech, pine, ash, walnut, elm, sycamore, and other classes that are useful in the industry. It has an abundance of coal and minerals to stimulate this industry. Flour and grist-mill products have long held the first place among the manufactures, but they are followed closely by both timber and machine-shop products. Manufacturing of this class is greatly facilitated by numerous navigable streams and rivers that furnish abundance of water power. Other manufactures that take high rank include tobacco products, cotton and woolen goods, paper, pottery, leather, railway cars, cotton-seed oil, and farming machinery Large iron ore smelters, stone quarries, and sorghum molasses plants are operated.

TRANSPORTATION. The State has extensive navigation facilities on the Cumberland, the Mississippi, the Ohio, and the Tennessee rivers. These navigable highways furnish direct communication with many ports on the Atlantic and the Gulf of Mexico. The railroad lines aggregate 4,300 miles, and considerable facilities are furnished by electric railways that extend into rural districts from the larger cities. The principal railroads within the State are the Illinois Central, the Southern, the Louisville and Nashville, and the Nashville, Chattanooga and Saint Louis. Among the exports from the State are coal, tobacco, lumber, iron and steel products, flour, and cereals. Nashville, Memphis, Chattanooga, and Knoxville are the leading commercial, railway, and manufacturing centers.

GOVERNMENT. The present State constitution was adopted in 1870. It vests the chief executive power in the Governor, elected for two years by the people. The secretary of State and the treasurer and comptroller of the treasury are elected by the Legislature, the former for four and the latter for two years, while the attorney general is appointed for six years by the judges of the supreme court. Educational work is supervised by the superintendent of public instruction, who is appointed by the Governor for two years and is confirmed by the senate. Five judges constitute the supreme court, and the term of service is eight years. The State is divided into circuit, chancery, and other court districts, and judges of these courts are elected by the people. Local government is administered in the counties, municipalities, and townships.

EDUCATION. A constant growth in educational work has been realized the past quarter of a century. In the decade from 1890 until 1920 the rate of illiteracy was reduced from 38.7 to 10.3 per cent. This wholesome, progressive development has continued to increase steadily. At present the illiteracy among native white people is 7.3 per cent. and among the colored inhabitants it is 22.4 per cent. The system of public schools is maintained by State and local aid, and the work is under the supervision of the State superintendent of public instruction, who is nominated by the Governor and confirmed by the senate. In 1907 the Legislature passed a law which makes the county the unit of school organization instead of the school district. A board of five members has general charge of the schools in each county. This board is presided over by the county superintendent, who is the ex officio secretary, and the effect has been to increase the salary of teachers, consolidate many of the schools, and extend the length of the

term. The State has about sixty high schools of the first class and many graded schools, but the system provides for separate instruction for white and colored pupils. Normal instruction is given at the George Peabody College for Teachers, at Nashville, and a number of other institutions.

The University of Tennessee, situated at Knoxville, is at the head of the educational system. Other institutions of higher learning include the Fisk University, Nashville; the Grant University, Athens; the Vanderbilt University, Nashville; the Maryville College, Maryville; the University of the South, Sewanee; the Southwestern University, Clarksville; the Scarritt College, Nashville; the Southwestern Baptist University, Jackson; and the Christian Brothers' College, Memphis. The State institutions are subject to investigation by a board of charities, which is appointed by the chief executive. Three hospitals for the insane are maintained, being located respectively near Bolivar, Knoxville, and Nashville. Knoxville has a school for the deaf and Nashville has institutions for the blind and for teaching the industries. A Confederate soldiers' home is situated near Nashville. The principal prison is likewise near Nashville. Many of the prisoners are required to work in the mines.

INHABITANTS. The population is about fifty to the square mile, and only 17,746 are of foreign birth. Nashville, on the Cumberland River, is the capital and Memphis is the largest city. Other important cities include Knoxville, Chattanooga, Jackson, Clarksville, Columbia, Johnson City, Murfreesboro, Union City, and Bristol. In 1900 the State had a population of 2,020,616. This number included 480,430 colored inhabitants, of which 108 were Indians and 480,223 Negroes. Population, 1920, 2,337,459.

HISTORY. The region occupied by Tennessee was first visited by De Soto, but settlements were not made until 1754, though these were destroyed by the Indians. In 1756 the first permanent settlement was founded on the Tennessee River, about thirty miles from Knoxville. Tennessee originally belonged to North Carolina and when that State proposed to surrender the territory to the United States, the settlers protested and organized a government known as the State of Franklin. This form of government continued from 1785 until 1789, when the region was ceded to the United States, and in the following year the Territory of Tennessee was established. It was admitted as a State in 1796, with the capital at Knoxville, whence it was removed to Nashville in 1802. In 1861 it joined the Southern Confederacy. However, the sentiment as to the war was divided, 31,000 of its citizens joining the Federal and 125,000 the Confederate forces. Many of the severe battles of the Civil War were fought within the boundaries of the State, including those of Murfreesboro, Lookout Mountain, Chickamauga, Island No. 10, and Nashville.

After the close of the war, in 1866, the State was readmitted to the Union, but much disorder prevailed for some time. In 1869 the Ku-Klux Klan caused some disturbances and several counties were placed under martial law. Subsequently much progress was made in the industrial and commercial developments. Prohibition was made an issue in 1908 and in the same year the Standard Oil Company was prohibited from doing business in the State. The general tendency of legislation has been toward progress in education and industrial enterprises.

TENNESSEE, a river of the United States, which is formed in eastern Tennessee, by the junction of the Holston and Clinch rivers, two streams rising in the southwestern part of Virginia. The course at first is toward the southwest, into northern Alabama, where it makes a bold turn toward the northwest and flows through Tennessee into Kentucky, entering the Ohio River at Paducah, Ky. The Tennessee is navigable for steamers to Florence, 258 miles, where a canal 35 miles long passes the Muscle Shoals Rapids, whence boats ascend 250 miles farther up the stream. The entire length from the source of the Holston is 1,175 miles, and from the junction of the Holston and Clinch rivers it is 800 miles to its mouth. It receives the Duck, Flint, Big Sandy, and Hiawassee rivers.

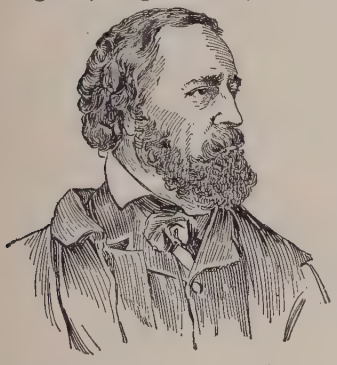
TENNESSEE, University of, an educational institution at Knoxville, Tenn., founded as Blount College in 1794. The name was changed to East Tennessee College in 1807, and it was reorganized in 1840 as the East Tennessee University. In 1879 the present name was adopted. Besides the university proper, it comprises the college of agriculture and mechanic arts. The departments in the college include engineering, agriculture, a literary division, and an industrial department for colored students. The university maintains courses in law, engineering, medicine, dentistry, and general academic work. The departments of medicine and dentistry are located at Nashville. A system of university extension work is carried on by means of conventions and institutes. The library has 78,500 volumes and the value of the property is placed at $4,600,000. About 4,000 students attend the institution.

TENNIEL (tĕn'yĕl), **Sir John,** painter and illustrator, born in London, England, in 1820. He took an interest in drawing at an early age, and in 1845 won a prize by competing in making a cartoon to be placed in Westminster Hall. Soon after he painted a fresco in the House of Lords. His best productions are cartoons in black and white, and most of these were published in *Punch.* He illustrated editions of "Through the Looking Glass," "Alice's Adventure in Wonderland," and "Aesop's Fables." His larger productions include "Allegory of Justice," "Saint Cecelia," and "Dropping the Pilot." He was knighted in 1893. He died Feb. 26, 1914.

TENNIS, a game of ball played in a court by two persons, or by four persons divided as

partners. The court usually is 96 feet long by 33 wide, inclosed with a wall sufficiently high to prevent the loss of balls by ordinary strokes. The ball is struck with a bat, called a *racket*, whose striking part is covered with a close, hard network of animal tendon. In tennis the persons strike the ball alternately, with the object of keeping it in motion as long as possible without falling to the ground. The same game is sometimes played without a bat, when the ball is struck with the palm of the hand, and is called hand tennis, or fives. *Hand tennis* is played to some extent in Great Britain and the United States, but the racket, or racquet, is used more commonly in France and Germany.

TENNYSON (tĕn'nĭ-sŭn), **Alfred, Lord,** eminent poet, born at Somersby in Lincolnshire, England, Aug. 6, 1809; died Oct. 6, 1892. He was the third son of George Clayton Tennyson, under whom he received his early training, and afterward studied at Cambridge University, where he gained a medal in 1829 for his poem entitled "Timbuctoo." While in college he formed the friendship of Monckton Milnes, Dean Alford, and Arthur Henry Hallam, son of the historian. His brother, Charles Tennyson (1808-1879), joined him in 1827 in publishing "Poems by Two Brothers," and his independent literary career may be said to have begun in 1830, when "Poems, Chiefly Lyrical" appeared. A volume entitled "Poems by Alfred Tennyson," which was published in 1842, won him a place among the leading English poets. The first of his longer poems was issued in 1847 under the title of "Princess: A Medley." He published "In Memoriam" in 1850, in which he immortalized the memory of his friend, Arthur Henry Hallam, who had died shortly previous to that date. He succeeded Wordsworth as poet laureate in November, 1850, received the degree of doctor of laws from the University of Oxford in 1855, and was raised to the peerage in 1874. His many excellent productions justly entitle him to a position among the greatest poets of modern times.



ALFRED TENNYSON.

The style of Tennyson is clear. His lines are often exquisitely beautiful, yet their flow is so easy and natural as to give the impression that they fell spontaneously from his pen. All his writings are characterized by an elevation of thought and high moral tone. The language in his verse is among the most faultless of English writings, and his poetry gives the reader a pleasant impression because of the cordial interest the author displays in the life and pursuits of men, as well as in beautiful aspirations and strength of spiritual feeling. Many of his writings have been translated into German, French, and Spanish.

The many masterpieces written by Tennyson place him in the front rank among the writers of the Victorian era. Among his writings that are not mentioned above are "The Charge of the Light Brigade," "Ode on the Death of the Duke of Wellington," "Demeter and Other Poems," "Enoch Arden," "Idylls of the King," "Harold," "Queen Mary," "Akbar's Dream," "Promise of May," "Foresters," "Maude," "The Falcon," "Sixty Years After," "Passing of Arthur," "Holy Grail," "Last Tournament," "Northern Farmer," "Locksley Hall," "Two Voices," "Dream of Fair Women," "Palace of Art," and "Lady of Shalott." "Crossing the Bar" was one of his last poems and was used in the services at his burial at Westminster Abbey. His widow, Lady Tennyson, died Aug. 10, 1896.

TENNYSON, Hallam, author, born at Twickenham, England, Aug. 11, 1852. The eldest son of the poet Alfred Tennyson, he was liberally educated and received an early inclination toward literature. He studied at Marlborough School and at Trinity College, Cambridge, and subsequently pursued a course in law at the Inner Temple. In 1870 he published a translation of "Brunanburh," a song in the old English. This first appeared in the *Contemporary Review* as a production in prose, and was subsequently turned into verse by his father. A juvenile work entitled "Jack and the Beanstalk" proved popular, and in 1897 he published the authorized biography of his father, entitled "Alfred, Lord Tennyson, a Memoir." In 1899 he was appointed Governor of South Australia, and in 1902 became Governor General of the Australian Commonwealth, but resigned the following year. He contributed extensively to periodical literature.

TENT, a dwelling made of canvas, felt, or the skins of animals. These materials are usually stretched upon cords or light frames, and are supported by poles set in the ground. Tents are the chief habitations of the nomadic tribes, like those of Arabia, Persia, and Turkestan. The children of Israel lived in tents for forty years while on their journey from Egypt to Palestine. The tents of the Saracens were not known to the nations of Europe until the time of the Crusades, and at that time they found many splendid tent habitations decorated with fine linen and costly furs. Marco Polo found the tents of the Khan of Tartary fitted with the richest skins brought from distant northern countries, such as the ermine of Siberia. The barbarous and wandering tribes of modern times continue to use tents as their chief dependence for shelter.

Tents are used extensively among the civilized nations, especially in military affairs and in ex-

ploring campaigns. In warm and dry climates they furnish shelter from the sun and are constructed in the form of an umbrella, with an open space all around for the circulation of the air. Those used in the colder countries are usually made of heavy duck, which is mounted on wooden frames and secured to the ground by pins or pegs. During the winter a double covering is used, the outer of these being an overlapping flap, and in this way they are comfortable even in very cold and damp weather. Tents of large size are employed in giving exhibitions and for Chautauqua purposes. These have a separate canvas for the walls, which are circular in form, and the roof is supported on heavy poles by means of ropes.

TENURE OF OFFICE, the duration or term of an official position, as well as the manner of holding it. Several important acts relating to this subject were passed by the Congress of the United States, though these refer more particularly to those filled by appointment of the President with the consent of the Senate. Prior to 1820 no term of office was provided for any inferior officer, except United States marshals, but in that year a bill was passed providing that a large number of officials are to be appointed for terms of four years. The bill which requires that certain postmasters be appointed by the President for four years and confirmed by the Senate, subject to removal at the pleasure of the President, was passed in 1836. Various offices have since been given the same term. In 1867 the Tenure of Office Act was passed, and was amended in 1869. It provided that no officer subject to confirmation by the Senate should be removed without the consent of that body, except during a recess, when the President might remove such an officer and appoint a successor until the next session of the Senate. This series of legislation paved the way for the so-called *spoils system,* which resulted in appointment being made from political motives rather than efficiency. A contest between President Cleveland and the Senate caused the law to be repealed in 1887.

TEPIC (tā-pēk′), a city in Mexico, capital of the territory of Tepic, 25 miles east of the port of San Blas. It has railway facilities, a mild and healthful climate, and a growing trade. The place is popular as a summer resort. The manufactures include cotton textiles, cigars, and clothing. It was founded in 1531. Population, 1922, 18,148.

TERCEIRA (tĕr-sā′ē-rā), one of the Azores, the second largest island of the group, about 50 miles northeast of Pico. The area is 163 square miles. It has steep and rocky coasts and the surface is mountainous. Several of the summits are volcanic. Caldeira de Santa Barbara, height 3,500 feet, is the highest summit. Fertile lands are located in many parts of the island and fine pasturage is abundant. The products include wheat, corn, wine, lumber, and live stock. Angra, on the southeastern coast, is the seat of local government. A large number of the inhabitants were Portuguese. Population, 1922, 49,426.

TERENCE (tĕr′ens), **Publius Terentius Afer,** Roman poet, born in Carthage, Africa, in 195; died in 159 B. C. He became the slave of P. Terentius Lucanus, a Roman senator, who gave him the means and opportunity to secure a liberal education and afterward freed him, largely because of his unusual talent. In 168 he published "Andria," his first play, but this was not acted until two years later. The popularity of this play was so great that the author was admitted into the most refined society of Rome, where he became eminent because of his talent and fine address. He received patronage from the younger Scipio and other eminent Romans, but about 161 went to Greece, where he translated 108 comedies written by Menander. Some writers assert that he died in Greece, while others contend that his death resulted from shipwreck while on his return journey to Rome. His works were written in the purest Latin, thus possessing educational value, but only six of his comedies are extant. These include "Eunuch," "Andria," "Adelphi," "Self Tormentor," "Phormio, or the Parasite," and "Hecyra, or the Stepmother." These writings have been widely translated into European languages, especially "Eunuch," which is the most popular.

TERHUNE (tĕr-hūn′), **Mary Virginia,** best known as *Marion Harland,* born in Amelia County, Virginia, Dec. 21, 1831; died June 3, 1922. Her father, Samuel P. Hawes, resided in Virginia, where he conducted a mercantile business. She began to write as a contributor to a weekly paper in Richmond at the early age of fourteen years, and in 1846 published "Marrying Through Prudential Motives." In 1856 she married E. P. Terhune, a minister, and soon after removed to Massachusetts, making her home mainly in Springfield. Many of her writings were contributed to magazines, including *Saint Nicholas* and *Wide Awake.* She established a magazine in 1888, called *The Home-Maker.* Among her published works are "The Hidden Path," "Husbands and Homes," "His Great Self," "Moss-Side," "Christmas Holly," "My Little Love," "Helen Gardner's Wedding Day," "Phemie's Temptation," "Eve's Daughters," "Our Daughters, and What Shall We Do With Them," "Marion Harland's Complete Cook-Book," and "When Grandma Was Fourteen."

TERMITES (tĕr′mīts), or **White Ants,** a class of insects confined chiefly to the tropics. They resemble in their mode of life the true ants, but belong to a different order. Most species make their nests on the ground, but some build their dwellings among the branches of trees. Those making their nests on the ground construct them in the form of a cone, often 10 to 25 feet high, and these are divided into apartments, such as galleries, magazines, and

chambers. Five classes of termites dwell in a single cone, including the males, females, neuters, soldiers, and workers. Soldiers, neuters, and workers appear to be imperfectly developed females. The males and perfect females have four large wings, but the principal part of the community is made up of workers, which are wingless. Mature males and females swarm into the air shortly after reaching maturity, when they lose their wings and become the so-called kings and queens of future generations.

The queen has a greatly extended abdomen, which contains the eggs, and these it drops promiscuously, to be carried by the workers into the different apartments. Other duties of the workers are to build the habitations, construct covered roads, minister to the wants of the young and the king and queen, and stimulate the exit of mature winged insects. The soldiers have a large, square head, with projecting mandibles, and their duty is to defend the community, which they do with singular courage. Termites feed largely on branches of trees and dry wood, which constitute their principal diet, but also on other vegetable forms. They are found in considerable numbers in Western Africa and the warmer regions of America, and in many places their buildings are constructed to form villages of numerous conical dwellings. The male has a painful though harmless bite. Ants and birds destroy large numbers of termites, and in some places they are prized as human food.

TERMITES AND THEIR NESTS.

TERN, a genus of gull-like birds which have the bill pointed and somewhat longer than the head. The wings are long, the tail is forked, and the plumage is chiefly white. They are smaller than most gulls, but are almost constantly on the wing, usually flying near the surface of the water in search of fish and other animal forms, upon which they feed. About fifteen species of terns are native to North America, including the royal tern, least tern, and Forester's tern. The royal tern frequents the Atlantic coast of North America. It is twenty inches long and has an alar extent of nearly fifty inches. Species of terns occur in Europe and Africa. Many of them are birds of passage and in the summer season reach high latitudes, both in the Northern and Southern hemispheres.

TERRACE (tĕr'rås), the name applied to a level tract of land bordering on a body of water, but elevated some distance above the surface. Terraces are found on the border of many rivers and lakes, and in many places occur near the ocean. They sometimes consist of a series of level tracts that rise above each other with the increase of the distance from the shore. The terraces that border rivers are explained by the action of the water at different periods. At an early date the streams were wider, when the flood plains were cut down, and successive terraces were formed as the channels narrowed and deepened from time to time, hence the older and higher elevations are removed farthest from the stream. Lake terraces may be traced to a shrinkage in the volume of the water, which is evidenced by the fact that they are usually well marked on several sides of the lake basin. Lake Champlain, the Great Lakes, and the sheets of water in the Great Basin have terraces due to this cause. These tracts are usually fertile and suitable for cultivation, though there are exceptions in the arid and desert regions.

TERRA COTTA (tĕr'rå kŏt'tå), an Italian term meaning *baked clay.* It is commonly applied to a species of hard pottery much used in statuary, vases, and building ornamentation. Terra cotta was employed by the ancients in the construction of figures and architectural ornamentations, and many well-preserved and artistically beautiful specimens of works in terra cotta have been recovered from the sites of ancient cities. Some of the finest specimens belong to the period of Greek art, probably about 450 B. C., and others to even earlier periods. Fine productions were not limited to Greece, but beautiful specimens have been exhumed from the cities of ancient Phoenicia, Babylonia, Assyria, and Rome.

In the 15th century terra cotta was adapted in many parts of Europe to the most artistic and elaborate architectural purposes, as is still evidenced by the fine churches of Saint Catharine, in Brandenburg; Saint Stephen, in Tanger Munde; and Saint Maria, in Milan. It continued a popular material until the 18th century, when it became more uncommon, but its use has been revived to a large extent within the past 25 years. Fine powdered silica and potter's clay constitute the principal ingredients of terra cotta as made as present. Many beautiful color effects are obtained, the most pleasing being a cream color and a rich red. It is possible to enamel or glaze in white and colors, this work being done in a manner similar to tile glazing.

TERRA DEL FUEGO. See **Tierra del Fuego.**

TERRAPIN (tĕr'rà-pĭn). See **Tortoise.**

TERRE HAUTE (tĕr'rẹ hōt), a city in Indiana, county seat of Vigo County, on the Wabash River, 72 miles southwest of Indianapolis. Communication is furnished by the Chicago, Milwaukee and St. Paul, the Big Four, the Chicago and Eastern Illinois, the Pennsylvania, and other railroads. It is surrounded by a fertile agricultural and mining country. The city has an attractive appearance, being located on an elevated plateau, and has broad and beautifully improved streets. Among the principal buildings are the county courthouse, the State normal school, the Providence Hospital, the Rose Polytechnic Institute, the high schools, and the Saint Mary's Seminary. Other features include the Federal customhouse, the public library, and Deming and Collett parks.

Terre Haute has a large trade in coal, grain, live stock, and merchandise. Among the manufactures are nails, flour, hardware, machinery, farming implements, packed meat, railway cars, and clothing. The streets are well lighted by gas and electric lights and beautified by avenues of trees. It has water and sewerage systems, an extensive line of street railways, and brick, asphalt, and macadam pavements. A bridge across the Wabash River gives the city connection with the west side. Terre Haute was settled in 1816 and chartered as a city in 1833. Population, 1900, 36,673; in 1920, 66,083.

TERRELL (tĕr'rĕl), a city of Texas, in Kaufman County, 30 miles east of Dallas, on the Texas Midland and the Texas and Pacific railroads. The surrounding country is fertile, producing cereals, cotton, and fruits. It is important as a market for live stock, farm produce, and merchandise. Among the manufactures are flour, leather, clothing, machinery, cotton and woolen goods, cigars, and earthenware. Electric lighting, sewerage, and several fine school and church buildings are among the general improvements. It is the seat of the North Texas Hospital for the Insane. The place was so named from Robert Terrell, who settled here in 1872. Population, 1920, 8,349.

TERRIER (tĕr'rĭ-ẽr), the name of a species of the domestic dog, so called from its courage in attacking small animals both above and under the ground. It pursues rats, badgers, cats, and foxes by digging into the earth. The *Scotch terrier* is a well-known breed and is distinguished by its dark eyes, prick ears, and rough-coated body. It is either black, reddish brown, or red and black, and weighs from fifteen to twenty pounds. The *bull terrier* is a breed crossed with the bulldog and is especially noted for its infinite courage. A large dog with straight hair of a black-and-tanned color is known as the *Welsh terrier,* and a yellow species with wire-hair is called the *Irish terrier.* The *skye terrier,* a species of the Scotch terrier, is prized for its long, silky coats. Several breeds of these dogs are called *fox terrier* and are distinguished by their gay and lively disposition, black and tapering nose, and fox-shaped ears. Other breeds include the *Boston terrier* and the *Clydesdale,* the *Yorkshire,* and the *Maltese* terriers.

TERRITORY (tĕr'rĭ-tô-rў), the term applied in various countries to certain portions of the public lands that are under the direct control of the national legislature, which have not been organized into a state or a province. The territorial form of government is usually maintained until the territory has developed sufficiently in wealth and population to entitle it to admission into the federation or union of states or provinces. In the United States the term is applied to any tract under the Federal government, and, after attaining sufficient population, it may adopt a constitution and be admitted into the Union on the approval of Congress. The term is used in a similar way in Canada and the republics of South America. Australia has one Territory, known as the Northern Territory, which is governed by the State of South Australia.

TERROR, Reign of. See **French Revolution.**

TERRY (tĕr'rĭ), **Alfred Howe,** military leader, born in Hartford, Conn., Nov. 10, 1827; died in New Haven, Dec. 16, 1890. He pursued a course of law at Yale University and in 1849 was admitted to the bar. From 1854 to 1860 he served as clerk of the superior and supreme courts of Connecticut, and within that period went to Europe to study the military defenses in the Crimea. He entered the United States military service at the beginning of the Civil War, was made brigadier general of volunteers in 1862, and took a prominent part in capturing Fort Wagner. In 1865 he commanded jointly with Admiral Porter in the attack on Fort Fisher, which was captured on Jan. 14 of that year, and for efficient services was made brigadier general and received the thanks of Congress. He became major general in the regular army on March 13, 1865, and subsequently commanded the departments of Dakota and the

South. In 1876 he had charge of an expedition against the Sioux Indians under Sitting Bull, whom he drove into Canada. In 1886 he succeeded General Hancock as full major general, and two years later voluntarily retired from the army.

TERRY, Ellen Alicia, actress, born in Coventry, England, Feb. 27, 1848. She was trained for the stage from early childhood, appearing in different rôles when only eight years old, but regularly entered upon the stage in 1858, when she took the parts of *Prince Arthur* in "King John" and *Mamillius* in "Winter's Tale." In 1863 she played in London as *Gertrude* in "The Little Treasure," *Hero* in "Much Ado About Nothing," and *Mary Meredith* in "Our American Cousin." She married Charles Kelley in 1864 and left the stage, but again appeared as a regular performer at the New Queen's Theater, London, in 1867. In the meantime she married Mr. Wardell, hence is known in private life as Mrs. E. A. Wardell. Later she played at the Prince of Wales Theater, where she took the part of *Portia,* and in 1878 appeared for the first time at the Lyceum, playing with much success in "Much Ado About Nothing," "Hamlet," "Romeo and Juliet," and "The Merchant of Venice." Later she played as *Henrietta Maria* in "Charles I.," *Viola* in "Twelfth Night," and *Camma* in Tennyson's tragedy of "The Cup." She accompanied Henry Irving on several successful tours in America and visited Germany and other European countries. Among her most successful rôles in the later period of her stage life are those of *Queen Catharine* in "Henry VIII.," *Lucy Ashton* in "Ravenswood," *Rosamonde* in "Becket," *Marguerite* in "Faust," and the *Heroine* in "Dead Heart." She died July 21, 1928.

ELLEN TERRY.

TERTIARY PERIOD (tĕr'shĭ-ā-rў), or **Cenozoic Era,** the division of geologic time that preceded the Quaternary era and followed the Mesozoic era. Geologists divide the rock system of this division into five periods, and sometimes they use the term Cenozoic to embrace both the Tertiary and the Mesozoic. During the Tertiary period violent changes took place on the exterior of the earth. The surface was largely above the sea, and within that time large portions of the Rocky Mountains, the Andes, and the Himalayas were formed. Owing to the surface of the earth being elevated in many localities, the age of ice, known as the Glacial period, took place in the temperate zones. Within the period many changes were wrought in the animals, both upon land and in the sea. Prior to this time great reptiles were common, and they were succeeded by gigantic mammals. See **Geology.**

TERTULLIAN (tĕr-tŭl'lĭ-ạn), **Quintus Septimus Florens,** Latin writer, born at Carthage, in Africa, about 160; died about 230 A. D. He was the son of a Roman centurion and at an early age embraced the Christian religion. For some time he preached at Carthage, and later at Rome. He is known for his controversy with others who were less rigid in their ethical views. In 202 he joined the Montanists, who were particularly rigid in morals and looked upon earthly pleasures with contempt. His most noted work is an address to the Roman magistrates in defense of Christianity, entitled "The Apology." By his writing and preaching he well deserves a place among the early Latin fathers of the Church. Among his books are "On the Dress of Women," "On the Proscription of Heretics," "On the Resurrection of the Body," "On the Flesh of Christ," and "Against the Gentiles."

TESLA (tĕs'là), **Nikola,** electrician and inventor, born at Smiljan, Croatia, Austria-Hungary, in 1857. After studying in the schools of his native country, he pursued a course in engineering at the École Polytechnique, Paris, and later became engineer of the Paris Edison station. He was employed for some time at the Edison Laboratory, near Orange, N. J., but later opened an establishment of his own to conduct research. Tesla takes high rank among the most eminent electricians and has made many valuable additions to the fund of knowledge in electrical science. He invented the rotary field motor in 1888, the multiphase system which was adapted to the 50,000 horse power plant that transmits the water power of Niagara Falls to Buffalo and other cities. He discovered that motors and electric lamps can be operated on one wire without a circuit. In 1899 he built a laboratory about ten miles from Pike's Peak, Colorado, where he conducted extensive research and soon after announced that he had discovered how to confine electrical currents of a pressure of 50,000,000 volts and how to produce electrical movements up to 110,000 horse power. He published an opinion that his instruments had been affected at different times by feeble electrical disturbances not of solar or terrestrial origin, and expressed the view that these disturbances were probably from the planet Mars, produced by instruments perfected and operated by inhabitants of that heavenly body. Whether or not this be true may only be conjectured, but it is certain that Tesla devised instruments of much power and remarkable perfection.

TEST OATH, the oath required under various acts of the Parliament of England, administered in connection with certain religious tests imposed upon persons who held public office. The first legislation of this kind was passed in the 17th century, and subsequent acts to secure

the establishment of the Protestant faith were enacted at different times. Most important of these were the Corporation Act of 1661 and the Test Act of 1673. The former provided that all magistrates were to receive the communion according to the Church of England, after taking the oaths of allegiance and supremacy. This test was further strengthened by the law of 1673, which made it obligatory upon those who passed the ordeal to renounce the doctrine that arms may be taken up against the king. After making numerous modifications, the statutes were repealed in 1828. A form of test by oaths was imposed in the United States after the Civil War, both by State and Federal legislation, but it was held to be unconstitutional.

TETANUS (tĕt'ā-nŭs), or **Lockjaw,** a disease characterized by painful and protracted contraction of a number of voluntary muscles. It is spasmodic in character and attacks sometimes succeed each other at intervals for several days or even weeks. Sometimes the muscular contraction is so intense that the lower jaw is held firmly against the upper jaw, frequently so strongly that they cannot be separated. The chief causes are injuries, intestinal worms, excessive wet and cold, and the presence of a bacterium in a wound. It affects both man and animals and violent cases are frequently fatal. Horses and sheep are more liable to it than other domestic animals.

TETZEL (tĕt'sęl), **Johann,** noted monk, born in Leipsic, Germany, about 1460; died in August, 1519. He descended from a Catholic family, studied theology in Leipsic, and became a Dominican monk in 1489. His ability as a pulpit orator caused the church authorities to engage him to preach in favor of indulgences with the view of raising money for religious purposes. He was appointed as inquisitor in 1516, when he published a design to grant indulgences with a view of raising money to aid in constructing the Church of Saint Peter at Rome. His designs were opposed by Martin Luther, who posted 95 theses on the door of the church at Wittenberg, in which he pointed out the inconsistency in the practice of selling indulgences. These were burned by Tetzel at Jüterbogk, in 1518, and the students of Wittenberg soon after publicly burned 800 tracts written by Tetzel in favor of the practice. Many biographers have written lives of Tetzel, many of which disagree as to his designs and the view he held regarding the forgiveness of sins committed by those purchasing indulgences.

TEUTONIC KNIGHTS (tû-tŏn'ĭk nĭtz), a powerful military and religious order which originated at the time of the Crusades. It was founded by citizens of Bremen and Lübeck for the purpose of aiding the soldiers who suffered during the siege of Acre, in 1190, and Frederick Barbarossa of Germany raised it to an order of knighthood. The grand master first dwelt at Jerusalem, but when Palestine fell into the hands of the Turks he removed to Venice, and later the headquarters were established in Germany. During the 15th century the order became very powerful and many eminent men of Europe, including Henry IV. of England, fought under its banner. It continued until 1809, when it was dissolved by Napoleon. The order was revived by the Emperor of Austria, in 1840, and it now has a large membership in that country.

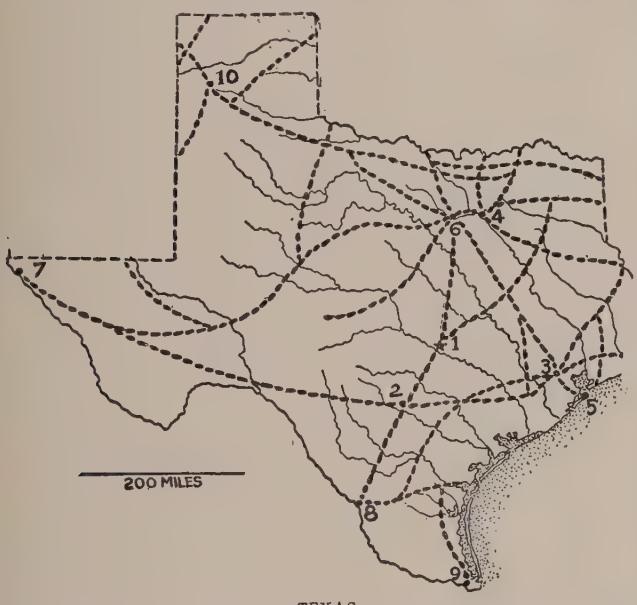
TEUTONS (tū'tŏnz), a tribe of Germans which inhabited the regions near the Baltic Sea, east of the Elbe. In 103 B. C. the Teutons joined the Cimbri to invade Gaul, where they successively destroyed three Roman armies. Soon after they proceeded to invade Italy, but were defeated with great loss by Marius in 102 B. C., in the region occupied by the French department of Vouches de Rhone. The name Teuton was ultimately applied to the Germanic people of Europe and is now used to denote Germans, Dutch, Scandinavians, and those of Anglo-Saxon descent, as opposed to the Celts. The Teutonic languages belong to the Aryan family and include three groups: the Low German, High German, and Scandinavian. The Low German dialects include the Gothic, Friesian, Flemish, Dutch, and English tongues; the High German tongues embrace the Old High German of the 7th to the 11th century, the Middle High German of the 12th to the 15th century, and the Modern High German; and the Scandinavian languages include the Swedish, Icelandic, Norwegian, and Danish tongues.

TEXARKANA (tĕks-är-kăn'ā), a city on the boundary line of Arkansas and Texas, being the county seat of Miller County, Arkansas, and situated partly in Bowie County, Texas. It is on the Saint Louis Southwestern, the Kansas City Southern, the Texas and Pacific, and other railroads. The surrounding country is a fertile agricultural region. The noteworthy buildings include the county courthouse, the post office, the Saint Agnes Academy, the Y. M. C. A. building, the Texarkana Industrial College, and many schools and churches. Among the manufactures are cotton goods, cotton-seed oil, railroad cars, ice, tobacco products, machinery, and farming implements. It has systems of waterworks, sanitary sewerage, and public lighting. The trade is large in produce, lumber, cotton, and merchandise. A settlement was made in the vicinity in 1873 and both towns were chartered as cities in 1887. The census of 1920 credits a population of 8,257 to the portion in Arkansas and 11,480 to the part in Texas; total, 19,737.

TEXAS (tĕks'ąs), a southwestern State of the United States, the largest in the Union, popularly called the *Lone Star State.* It is bounded on the north by New Mexico, Oklahoma, and Arkansas; east by Arkansas, Louisiana, and the Gulf of Mexico; south by the Gulf of Mexico and Mexico; and west by Mexico and New Mexico. The greatest length from east to west

is about 875 miles and the greatest width is 745 miles. It is in the form of an irregular triangle, the apex extending south, and a square known as the *Pan Handle* lying toward the north. The area is 265,780 square miles, of which 3,490 square miles are water surface.

DESCRIPTION. The coast line has a length of 372 miles along the Gulf of Mexico, being in the form of a crescent, and the shores are indented by numerous bays. Among the inlets are Sabine Pass and the bays of Galveston, Matagorda, San Antonio, and Corpus Christi. A number of islands of more or less importance lie near the shore, including Galveston, Matagorda, Mustang, Padre, and Saint Joseph. Padre Island is a narrow stretch of land extending from near the mouth of the Rio Grande toward the north, having a length of about 100 miles and forming the extremely salty Bay of Laguna de Madre. Farther north the lagoons extend inland as irregular bays and estuaries and are lined by marshy shores or high bluffs.



TEXAS.

1, Austin; 2, San Antonio; 3, Houston; 4, Dallas; 5, Galveston; 6, Fort Worth; 7, El Paso; 8, Laredo; 9, Brownsville; 10, Amarillo. Chief railroads shown by dotted lines.

Texas has an exceedingly varied surface, the coast region being low and marshy, whence the surface rises gradually toward the northwest. A belt known as the Black Prairie extends along the Gulf. This region is about 100 miles wide in the north and south, but it is somewhat narrower in the central part. Near the Gulf the elevation is not only a few feet above the level of the water, but it rises gradually toward the inland, attaining a height of about 500 feet at a distance of 150 miles inland. This section is very level, but it merges into a gently undulating plain. In the eastern part it is covered by extensive forests, and toward the northwest is the Grand Prairie, a plateau of great fertility. The Staked Plains, or Llano Estacado, a region quite arid and treeless, occupies the western part. Between the Pecos and the Rio Grande are the Guadalupe, Eagle, and other mountains. In this region the general elevation ranges from 3,000 to 9,000 feet above the sea. Among the principal summits are Eagle Mountain, 7,000 feet, and Guadalupe Peak, 9,000 feet. The general altitude of the Staked Plains and the Pan Handle ranges from 2,700 to 4,000 feet. Most of the State has an undulating surface and a fertile soil, but denuded and sandy tracts lie in the western part, where deep canyons have been cut into the plains by excessive rains in former periods.

The drainage is exclusively into the Gulf of Mexico, and the rivers have a general course toward the southeast. All of the boundary with Mexico is formed by the Rio Grande, which receives the inflow of the Pecos, its largest tributary. These rivers and the Canadian, which flows through the northern part, rise in the Rocky Mountains. All the other streams rise within the State, including the Red River, which forms the greater part of the boundary with Oklahoma, while a part of the Louisiana border is formed by the Sabine River. Among the principal rivers within the State are the Neches, Trinity, Brazos, Colorado, Guadalupe, San Antonio, and Nueces. These streams flow chiefly into inlets from the Gulf, and a number are navigable during high water for considerable distances, but bars somewhat obstruct their mouths.

CLIMATE. The climate varies greatly with location in latitude and is noticeably affected by differences in altitude. As a whole the climate is drier than that of the other Gulf States. In January the mean temperature at Galveston is 45° and at Amarillo it is 40°, and the corresponding figures for July are 84° at Galveston and 76° at Amarillo. The freezing point is very seldom reached on the coast, but in the northwest the temperature sometimes falls as low as zero. On the coast the maximum heat ranges from 90° to 95° and in the western highlands it approximates 100°. Rainfall is abundant in the coast region and the central part, where it ranges from 30 to 50 inches, but in the western part it is scant, being about 10 inches at El Paso and 22 inches at Amarillo.

MINING. Texas produces about 140,000,000 barrels of petroleum per year. Large fields of lignite and bituminous coal are found, and the annual output now proximates about 1,250,000 tons. Phosphate rock is obtained in large quantities. Extensive fields of petroleum and natural gas

occur in many parts of the State, especially in Presidio, Hardin, Stephens, and adjoining counties. Copper, pig iron, and gypsum are obtained in large quantities. Cinnabar is found in deposits along the Rio Grande and in the southwestern part of the State, and extensive beds of salt, granite, limestone, and sandstone are worked. Clays suitable for brick and pottery are abundant. Other minerals include silver, mineral waters, and asphalt.

Agriculture. Texas is one of the chief agricultural states of the Union, having a favorable climate and a large area of productive land. About 75 per cent. of the total surface is included in ranches and farms, which average 257 acres. In the aggregate value of farm products the State takes first rank, but crop raising is confined chiefly to the central and eastern parts, though large areas in the northwestern section have been improved for farming within the last few years. Corn and cotton are raised on larger areas than all other crops combined; the acreage of corn is 3,500,000 and of cotton 18,500,000 acres. Wheat takes rank as the third crop in acreage, but it is closely followed by hay and oats. Other important crops include dry peas, sweet potatoes, Kafir corn, sorghum and sugar cane, potatoes, peanuts, tobacco, and rice. Large areas of the lowlands along the coasts are devoted to the culture of rice and sugar cane. Kaffir corn, millet, oats, and wheat are important crops in the northwest. The most valuable lands lie immediately between the coastal region and the drier belt of the west and northwest. Fruits of all kinds are grown with profit, and some sections are especially valuable for raising oranges, lemons, bananas, vegetables, and small fruits.

While dairying is an important industry, cattle raising is chiefly for meat. Live stock is grown profitably in all parts of the State, but receives special attention in the great grazing region of the western section. In the number of beef cattle the State holds first rank. It has correspondingly large interests in rearing horses, sheep, swine, and poultry. Texas takes first rank in the number of horses and cattle, tenth in swine, and first in sheep.

Manufactures. The State has vast quantities of materials to stimulate manufactures of all kinds. An abundance of timber in the east, such as oak, cedar, pecan, cypress, hickory, and pine, furnishes much for construction and manufacturing purposes. Many species of cacti thrive in the Rio Grande valley, some of which attain the size and height of trees and yield material for fuel. Flour and grist, coke, lumber products, and foundry and machine-shop products are among the leading manufactures, and these are made entirely from materials produced in the State. Cotton and cotton-seed products, tanned and finished leather, ice, and molasses are produced in large quantity. The State has a large output of cigars, plug and smoking tobacco, saddlery, clay products, cured meat and fish, railway cars, steam engines, potash, and canned fruits and vegetables.

Commerce and Transportation. The domestic and foreign trade is extensive. Local shipments are carried by steamboats along the coast and inland by numerous railways. Wool, live stock, cotton, lumber, fruits, vegetables, and tobacco products are exported. Galveston, Corpus Christi, Brazos de Santiago, Saluria, and Paso del Norte are the chief ports. Galveston takes rank as the second largest port on the Gulf.

The lines of railways have a length of 15,837 miles. The west central part is partly without railroad facilities, but all other sections are supplied with numerous trunk and branch lines. Among the principal railroads are the Texas Pacific, the Kansas City Southern, the Southern Pacific, the Chicago, Rock Island and Pacific, the Missouri, Kansas and Texas, the Saint Louis and Southwestern, the Atchison, Topeka and Santa Fé, the International and Great Northern, and a number of others. Electric lines are operated in the larger cities and many interurban and rural districts. Much has been done to improve the highways by grading and the construction of bridges.

Government. The present constitution was adopted in 1875. It vests the chief authority in the governor, lieutenant governor, comptroller, treasurer, attorney-general, commissioner of the general land office, and superintendent of public instruction, all elected for two years. Three railroad commissioners are elected for three years. Several State officials are appointed by the Governor, including the adjutant general, the secretary of State, and a number of others. The supreme court consists of a chief justice and two assistant justices, each elected for six years. In addition there are a court of criminal appeals, five courts of civil appeals, district courts, county courts, and justices of the peace. Local government is administered by the counties, municipalities, and townships.

Education. Based upon the total population, the rate of illiteracy is 8.3 per cent., but among whites it is 3.1 and among blacks it is 17.8 per cent. A large State endowment is available for the support of the public schools, which, together with local school taxes, places the educational work on a very satisfactory basis. Elementary schools are maintained in the rural districts, while the towns and cities have well-organized secondary and high schools. Much progress has been made in establishing kindergarten and manual training work in the larger cities. The general supervision of the schools is vested in the State superintendent of public instruction, who is aided by a board of education, and separate schools are maintained for white and colored children. Normal schools for whites are located at Commerce, Kingsville, Nacogdoches, Alpine, Huntsville, San Marcos, and Denton. At Prairie View is a normal school for Negroes. Summer schools are supported for

training teachers. These institutions are in session a term of about four weeks and have an attendance of more than 10,000.

The University of Texas, located at Austin, is at the head of public instruction. College Station has the Agricultural and Mechanical College and Galveston has the medical branch of the University of Texas. Many private schools and institutions of higher learning are in a flourishing condition. These include the Polytechnic College, Fort Worth; the Texas Christian University, Fort Worth; the Evangelical Lutheran College, Brenham; the Southwestern University, Georgetown; the Baylor University, Waco; the Henry College, Campbell; the Fort Worth University, Fort Worth; the Saint Edward's College, Austin; and the Trinity University, Waxahachie. Austin, Terrell, and San Antonio have asylums for the insane; Austin has a school for the deaf and dumb; and institutions for the blind, both for white and colored youth, are maintained at Austin. Corsicana has an orphans' home and Austin has the Confederate Soldiers' Home. Penitentiaries are located at Huntsville and Rusk, a girls' reformatory is at Gainesville, and Waco has a children's home.

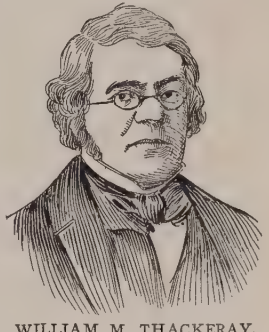
INHABITANTS. The average density is about eighteen persons to the square mile. It has a larger immigration than any other State in the South, and the foreign-born inhabitants number 360,519. The Baptist denomination has the largest membership. Other religious bodies strongly represented include the Methodists, Christians, Presbyterians, Roman Catholics, Episcopalians, and Lutherans. Austin, on the Colorado River, is the capital. Other cities of importance include San Antonio, Houston, Dallas, Galveston, Fort Worth, Waco, El Paso, Laredo, Denison, Sherman, Marshall, Taylor, Gainesville, Corsicana, Brownsville, Palestine, Brenham, Corpus Christi, and Greenville. In 1900 it had a population of 3,048,710, hence takes rank as the most populous State in the South. This number included a colored population of 622,041, of which 470 were Indians, 836 Chinese, and 620,722 Negroes. Population, 1920, 4,663,228.

HISTORY. Texas was originally a part of the Spanish possessions in America. It was explored by Cabeza de Vaca in 1528 and first settled by La Salle in 1685, on the Lobaca River, where Fort Saint Louis was founded. Many severe and extended contests with the Indians occurred to interfere with rapid development. In 1820 the eastern boundary of Texas was settled in a treaty with Spain and at the same time American colonists were invited to make settlements within the region. Representatives of 20,000 settlers met at a State convention in 1833 and adopted a constitution, but Santa Anna, President of Mexico, refused to recognize it as a State, preferring to establish several departments. He accordingly invaded Texas with a large army, but was defeated by General Houston, in 1836, in the Battle of San Jacinto. The people had already declared the independence of Texas and, after adopting a constitution, elected General Houston president. The new government was recognized as independent by the United States, Belgium, France, and England in 1837, but a large majority of the people favored annexation to the United States. Both houses of Congress passed a joint resolution annexing Texas on Dec. 29, 1845.

The policy of the United States and the dispute over the western boundary of Texas caused the Mexican War, which terminated with the Treaty of Guadalupe Hidalgo. In 1850 all the previously Mexican territory lying outside the present limits of the State was ceded to the United States in consideration of the payment of $10,000,000. An ordinance of secession was passed Feb. 1, 1861, but Texas was restored to the Union on March 30, 1870. The Federal policy of reconstruction caused the State to become in debt to the extent of several million dollars. However, the growth in wealth and population since the war has been phenomenal, and there are yet many opportunities for young men to find fields for the development of lucrative industrial enterprises.

TEXAS, University of, an educational institution at Austin, Tex., founded by an act of the Legislature in 1876. It was open for instruction in 1883, when it received an additional grant of land from the State. It embraces the departments of arts and sciences, education, business administration, medicine, engineering, law, pharmacy, nursing, physical training, mines and metallurgy, and the graduate school. The university conducts a line of summer school work. It has a library of 286,707 volumes and property valued at $7,946,831; the students average 10,672.

THACKERAY (thăk'ĕr-ĭ), **William Makepeace,** novelist and humorist, born in Calcutta, India, July 18, 1811; died Dec. 24, 1863. He was a son of Richard Thackeray, who served for many years as a civil officer in the employ of the East India Company. His education was obtained at London Charterhouse School and Cambridge University, but he left the latter before graduating. Subsequently he studied at Weimar, Germany, where he formed the acquaintance of Goethe. He had fallen heir to a large fortune at the death of his father, but this he soon spent by traveling and personal liberality. It was his original intention to become an artist, for which purpose he visited Italy and France, but he soon became convinced that literature would more nearly suit his taste and ability.



WILLIAM M. THACKERAY.

His first writings were in the form of contributions to *Fraser's Magazine,* under the names of George Fitz-Boodle and Michael Angelo Titmarsh. These writings consisted of poetry, tales, and criticisms, which he illustrated by his own pencil. In 1840 he published "The Paris Sketch Book," and the following year contributed "The Snob Papers" to *Punch.* "Vanity Fair," published in monthly parts from 1846 to 1848, gave him first rank among the novelists of England. His series of lectures on "English Humorists of the Eighteenth Century" was delivered in England and Scotland, in 1851, and was soon after published in America.

In the period from 1852 to 1855 he planned and wrote his "Newcomes," which is the most popular of his novels. It presents as a leading theme the misery occasioned by ill-sorted marriages. He became editor of the *Cornhill Magazine* in 1859, to which he contributed his "Roundabout Papers," but severed his connection with that periodical in 1862. Thackeray had the true poetic instinct, his works taking high rank in versification, humor, and grace. He is regarded by many as one of the leading, if not the leading, English novelists, critics, and essayists in the reign of Queen Victoria. He was buried in Kensal Green, and a fine bust was placed to his memory in Westminster Abbey. Among the writings not already mentioned are "Great Hoggarty Diamond," "Barry Lyndon," "Yellowplush Papers," "Second Funeral of Napoleon," "Irish Sketch Book," "History of Pendennis," "Virginians," "Denis Duval," "Esmond," and "Lovel the Widower." He lectured for some years on "The Four Georges."

THALBERG (tăl'bĕrg), **Sigismond,** musician, born at Geneva, Switzerland, Jan. 7, 1812; died Aug. 26, 1871. He was a son of Prince Moritz Dietrichstein, who provided for his musical education at Vienna. In 1830 he began to appear in public, and four years later was made chamber virtuoso at the court of Austria. He appeared in Paris as the rival of Liszt, and subsequently won applause in many countries of Europe and in the United States. In 1862 he made a tour of Brazil and other countries of South America. As a musician and singer he took high rank, and is the author of numerous compositions for the piano.

THALER (tä'lĕr), a monetary coin first made in Bohemia in 1519, where it was known as *Joachimsthaler.* It was so named from Joachimsthal, the town in which it was first made. This coin was the unit of value in Germany until 1873, when it was superseded by the mark. A small quantity of these coins are still in circulation, valued at about seventy-one cents, or three marks.

THALES (thā'lēz), eminent Greek philosopher, born in Miletus, Asia Minor, about 640; died in 548 B. C. Little is known of his life, but he is classed as one of the seven wise men and is regarded the founder of Greek astronomy, geometry, and philosophy. He was of noble birth and it is thought that he received instruction in geometry and other branches from the priests of Egypt, where he evidently spent a number of years. After returning to Greece, his reputation for wisdom and learning spread with remarkable rapidity, but his renown was extended subsequent to his death because he had predicted an eclipse of the sun which took place on May 28, 525 B. C. He taught his doctrines orally to his disciples instead of committing them to writing, and it is only from the later writers of Greece, such as Herodotus and Aristotle, that we are privileged to know anything regarding him.

THALIA (thā-lī'ā), in Greek mythology, one of the nine Muses. She presided over comedy and idyllic poetry. In statuary she is represented with the comic mask, a wreath of ivy, and the shepherd's staff.

THALLIUM (thăl'lĭ-ŭm), a soft, white, crystalline metal occurring in small quantities, used in alloys and glassmaking. It is slightly heavier but softer than lead. Thallium has a specific gravity of 11.9, its salts are exceedingly poisonous, and it imparts a green color to a flame. Crookes discovered this metal in 1861 by the use of the spectrum, while inspecting deposits accumulated in a sulphuric acid factory. Small quantities of thallium occur in iron pyrites, and it is obtained from the dust which collects in the flues of sulphuric acid works when these pyrites are burned for the production of sulphur dioxide. It is found in native sulphur and with copper. The salts of thallium are poisonous.

THAMES (tĕmz), a river in England, which rises in the Cotswold Hills and, after a course of 222 miles toward the east, flows into the North Sea. The basin has an extent of 5,425 square miles. In the greater part of its course it forms the boundary line between a number of the counties of southern England. Large vessels ascend to London, 60 miles from its mouth. It is of vast commercial importance because of numerous canals that connect it with trade and manufacturing centers. Many bridges cross it at London, where extensive embankments and dock improvements are maintained. The tide is perceptible seventy miles up the river from its mouth, which is eighteen miles wide. Among the principal cities on the Thames are London, Gravesend, Greenwich, Windsor, Eton, Henley, Reading, and Oxford. Its tributaries include the Kennet, Mole, Darent, Medway, and Roding.

THAMES, Battle of the, an engagement of the War of 1812, fought at the Moravian settlement on the Thames River, in the Province of Ontario. It occurred on Oct. 5, 1813, when the Americans under General Harrison made an attack upon the British under General Proctor. The latter was aided by a force of Indians under Tecumseh, who was slain, and the British were defeated. Col. Richard M. Johnson led a famous cavalry charge against the British and it is

claimed that he personally slew Tecumseh. The result of the battle was that the British lost all the advantages gained by Hull at Detroit and the confederation of Indians was broken.

THANE, the name of an ancient rank among the Anglo-Saxons, although it was first applied to the followers of kings and chieftains. Ultimately there were two classes of thanes, one known simply as thanes, and the other as king's thanes. It was possible for all to attain to the rank, which was bestowed either as a reward for valued services to the state or in recognition of those who possessed considerable property of value. The titles of thane and baron were used interchangeably after the Norman conquest, and, according to some writers, the thanes were subsequently called barons. It is probable that the inferior thanes were later termed knights and that the title of baron was extended only to the superior thanes.

THANET (thăn'ĕt), **Isle of,** an island of England, on the northern coast of Kent, separated from the mainland by the Stour River and its branches. It is about five miles wide and ten miles long. The area is 41 square miles. The surface is level and fertile and it has some interests in agriculture and stock raising. Ramsgate, Broadstairs, Westgate, and Margate are famous as watering places. Population, 1916, 68,450.

THANKSGIVING DAY, a festival of thanksgiving, set apart to return thanks for the harvest and mercies of the closing year, which resembles the feast of ingathering held by the Hebrews. The Pilgrim Fathers at Plymouth, in 1621, kept the earliest harvest thanksgiving in America, and in the succeeding centuries the practice was frequently repeated. In many of the colonies the governors appointed a day for rejoicing in the autumn, especially in the New England States, where thanksgiving services have been popular from the early settlements and where Thanksgiving Day still ranks as the special annual festival. Thanksgiving services were recommended by Congress for each year of the Revolutionary War, and in 1784 a special day of thanksgiving was appointed for the return of peace. After the adoption of the Constitution, in 1789, Washington appointed a thanksgiving day, while a special thanksgiving for the welfare of the nation was given in 1795, and another for the return of peace was appointed by Madison in 1815. The festival has been observed annually in New York since 1817, but its general observance in the United States dates from 1863, when Lincoln issued a proclamation recommending that the last Thursday of November be observed as Thanksgiving Day. All the succeeding presidents have regularly issued proclamations calling the attention of the nation to the observance of this festival, which ranks as a legal holiday, and the duty of observing it in a fitting manner is likewise proclaimed by the various governors, in whom alone is vested the legal authority to declare a holiday within the states.

THASOS (thā'sŏs), an island in the Aegean Sea, off the coast of Macedonia. It has an area of 85 square miles. The surface is mountainous and quite barren and near the center of the island is Mount Hypsarion, height 3,428 feet. Lumber, honey, olive oil, gold, and wine are the chief products. The island was colonized by the Phoenicians at an early date and was captured by Darius in 492 B. C. It was subject to Athens for many years and later to the Romans. The Turks captured it in 1462, since which time it has been a possession of Turkey. Population, 12,150.

THAYER (thâr), **Sylvanus,** soldier and military engineer, born in Braintree, Mass., June 9, 1785; died there Sept. 7, 1872. In 1807 he graduated from Dartmouth College and the following year from the United States Military Academy. Shortly after he was assigned for duty to the engineer corps. After serving as engineer and instructor in mathematics at the academy for four years, he was promoted first lieutenant for gallantry in the War of 1812. He served under Gen. Wade Hampton on Lake Champlain in 1813, and the following year went to Europe to examine military works and study the operations of the allied armies at Paris. In 1817 he became superintendent of the United States Military Academy at West Point, where he rendered valuable services and placed that institution in its present efficient condition. He retired from teaching at West Point in 1833 and spent the succeeding thirty years in constructing defenses at Boston harbor. In 1863 he withdrew from active service with the rank of brigadier general. Thayer is the author of a number of valuable papers on engineering and donated liberally toward the extension of education. Among his gifts are $10,000 to the public library at Braintree, $300,000 to an academy at Braintree, and $70,000 to the Thayer School of Civil Engineering at Dartmouth. A monument to his memory is situated at West Point, on which is the inscription, "Colonel Thayer, Father of the United States Military Academy."

THEATER (thē'ā-tēr), a building especially adapted to the representation of dramatic, operatic, or spectacular performances. The theater had its beginning in Greece, where the first drama was presented in a movable vehicle about 750 years before the Christian era. Later wooden scaffolds were constructed in public places on which to give performances, but the occurrence of an accident in 500 B. C. suggested the construction of a permanent building capable of accommodating large numbers. Plans for the first noted theater were soon after completed, but the building itself was not finished until 340 B. C. In the meantime many theaters on the same model were erected in Greece and Asia Minor.

The great stone theater of Dionysus at Athens was built in an inclosure sacred to Dionysus,

its auditorium being hewn in the solid rock at the southeast side of the Acropolis. All the celebrated Grecian theaters were similarly constructed, a fact evidenced by the ruins of ancient cities, but the Romans began to build them on level sites in the 1st century B. C. Some of these theaters surpassed in magnitude the finest temples, many having a capacity of 10,000 to 30,000 persons, and others even for a much larger number. The theater of Marcellus at Rome, whose external walls are still in existence, had a seating capacity of 30,000 spectators.

The theaters of Greece were semicircular, resembling the half of an amphitheater, and that part in which the chorus sang and danced was called the *orchestra.* The stage for the performers was behind the orchestra, facing the audience, and back of the stage was a permanent and finely decorated scene. The large paintings at the rear of the stage represented landscapes or buildings, as might best serve the purpose to convey a vivid impression in connection with the players and the plot of the drama. Roman theaters were similarly constructed, but the space between the stage and the audience was reserved to the senators instead of being occupied by the chorus. However, they were built on level ground instead of being hewn or cut in the side of a hill. The seats were arranged in tiers on a concentric plan and the buildings were not covered by a roof, but the portion containing the stage and chambers connected with it was usually surrounded by a portico.

Stage scenery was entirely unknown in the early period of the theater, but later it was introduced gradually, though the Romans employed stage effects of more elaboration than was the custom in Greece. Pericles made the theaters free to the public, the expense being borne by the government, and the scenes presented were of a character designed to teach the people history, poetry, oratory, and other branches of useful knowledge. The theater declined with the decadence of Rome, and the only theatrical entertainments given during the Middle Ages consisted of the miracle plays, interludes, and mysteries, which were presented in many places in the churches and cathedrals, as well as in halls and convents. In many cities theatrical plays were acted in the open air.

The modern theater dates from the revival of classical literature in the 16th century, when the classical drama was revived. Among the first theaters of modern times is the one opened in Paris by the Confraternity of the Trinity in 1548, at which secular performances were given. The first to be erected in Italy was completed in Florence, in 1581, and one of excellent architectural design was built at Parma in 1618. In 1576 the first theater was erected in England, known as the London Theater, and about the same time were constructed the playhouses in Whitefriars, in Blackfriars, and the Curtain in Shoreditch. The playhouse in Blackfriars became famous because of being the scene of Shakespeare's plays, and the success attending them stimulated many others to write and act dramatic productions. Cardinal Richelieu built the Palais Royal in Paris in 1639, which, in the time of the Revolution, became one of the most famous theaters of Europe, being then known as the Theatre Français. France now has theaters of great beauty and artistic dignity, and the Grand Opera of Paris still ranks among the largest and finest in the world.

The first theater built in America was opened at Williamsburg, Va., in 1752, but performances in halls and other buildings date practically from the first settlements. The theaters of Germany are noted for paintings of very high artistic merit and splendid decorative effects in connection with stage scenery. Gas was first used in a Parisian theater in 1822, but electric light has gone into use in practically all the larger theaters, its effect in general lighting and for scenic flashing being the most beautiful. Theaters are controlled by national laws in most European countries, but in the United States and Canada they are regulated and licensed by the municipal corporations in which exhibits are given. The property is not only subject to general taxation, but in most towns and cities strolling companies are required to pay a license, while in some places an annual license is charged to the owner of the building. The larger theaters of North America include the Metropolitan Opera House, New York, and the Majestic and the Auditorium, Chicago. However, they are inferior to the great theaters of Europe, such as the Paris Grand Opéra, which cost $4,000,000.

THEATINES (thē'ā-tīnz), an order of monks in the Roman Catholic church. It was founded by Pope Paul IV. in 1524, who was then bishop of Theate, hence its name. Formerly it had a large membership in Spain, Portugal, and France, but at present it is represented chiefly in Italy. The main object is to oppose heretics, to reform the clergy, and to attend the sick and criminals.

THEBES (thēbz), a celebrated city of ancient Egypt, whcih was for centuries the capital of that country. It occupied an extensive site on both sides of the Nile, about 300 miles south of Cairo, and is thought to have been founded by Menes, the founder of the Egyptian monarchy. The river divided the city into four parts, two being on each side of the Nile. Those lying on the east bank were known as Karnak and Luxor, and those on the west bank, as Gurnah and Mendinet-Habu. The city had its greatest prosperity for the five centuries included between 1500 and 1000 B. C., and it began to decline rapidly about 800 B. C., when Memphis, the ancient capital of the Pharaohs, rose to importance as a rival city. No ancient city contains more splendid ruins than Thebes, but now only a few Arabs occupy its site, who earn their subsistence by directing tourists to the different places

of interest. The Palace of Luxor and the Temple of Karnak, of which ruins still remain, occupied imposing sites on the east side of the Nile, and in front of the former were beautiful obelisks of red granite. One of these obelisks is now in Paris, in the Place de la Concorde.

Thebes was the seat of the cemeteries of the Theban monarchs, in which fine sepulchers were hewn in the rock, and from them thousands of mummies have been taken. On its site are the remains of extensive temples, palaces, and monuments. The notable statues include the one of Memnon, which is in ruin. This art product was supposed in early times to give out at sunrise a sound like the twanging of a harp string, but it is thought that the sound was made by a person concealed within. Other objects of interest include the Memnonium or temple of Rameses II., the temple and palace of Rameses III., the tomb of Sethi I., and the portico of Shishak I. Thebes was able to send forth powerful armies of charioteers, who enriched its temples and palaces with the wealth brought from Ethiopia, Arabia, and Asia Minor. It is estimated that the Persians obtained $10,000,000 in valuable spoils at the time Cambyses plundered the city in 525 B. C., but it was not finally destroyed until about 86 B. C.

THEBES, a city of Greece, in Boeotia, thirty miles northwest of Athens. The ancient city occupied a mountain slope between two streams and is said to have been founded in 1500 B. C. by Cadmus, after whom it was named Cadmea. This name was afterward applied only to the ancient citadel, while the enlarged city was named Thebes. Little is known of its history prior to the 6th century B. C. aside from the fact that it had an aristocratic constitution and claimed sovereignty over the other towns of Boeotia. Its relations to Athens were generally unfriendly, hence it sided with Xerxes at the time the Persians invaded Greece, but was saved from a retaliatory attack of the Athenians by the intervention of Sparta. Thebes sided with Sparta in the Peloponnesian War, but, when Sparta became the predominating influence in Greece, it gave shelter to the exiles from Athens, who were compelled to flee from their city by the oppressive rule of the Thirty Spartan Tyrants. This occasioned a prolonged war between Thebes and Sparta, but the former became victorious in 362 B. C., as a result of the heroic leadership of Epaminondas, and thus rose to the foremost political power in Greece.

However, Athens prospered and again rose to contest for supremacy, but under the leadership of Demosthenes the two cities united against Philip of Macedon. This military leader had invaded both Attica and Boeotia with a powerful army, and in 338 B. C. defeated the allied Thebans and Athenians at Chaeronea, thus crushing Grecian liberties. Thebes revolted against Alexander the Great in 335 B. C., but that general made short work of the city by slaying 6,000 Thebans and carrying 30,000 away as slaves. Cassander rebuilt the city in 315 B. C., but it was taken by Demetrius Poliorcetes in 290 B. C. and never again rose to importance. It sided against the Romans in the Mithridatic War in 86 B. C. and was plundered by Sulla. In the period between the 10th and 12th centuries Thebes became celebrated for its manufacture of silk and cloth, but was plundered by the Normans of Sicily in 1143, and when the Crusaders captured Constantinople, in 1204, it was made a fief of the feudal empire. The present town of Thebes occupies the ancient citadel of Cadmea. It is the seat of a bishopric and has a population of 3,875.

THEINER (tī'nĕr), **Augustin,** author, born in Breslau, Germany, April 11, 1804; died in Civita Vecchia, Italy, Aug. 10, 1874. He studied at Breslau and the University of Halle, and soon after made an extensive tour through Austria, Switzerland, and France to consult libraries and archives. Subsequently he settled in Rome, where he became a member of the oratory of Saint Philip Neri. He was made keeper of the secret archives of the Vatican, a position he held for a number of years, but was removed from office in 1870 on a charge of having furnished documents in opposition to the dogma of infallibility. His brother, Johann Anton Theiner (1799-1860), was a noted author and teacher. He instructed a number of years at Breslau, officiated as a Roman Catholic priest from 1830 to 1845, and was made secretary of the Breslau library in 1855. The former wrote partly in Latin and partly in German, his works including numerous treatises on religious doctrines and practices, while the latter is the author of numerous works in German. His principal publications include "Reformatory Measures in the Catholic Church," "Treatises on the Doctrine and Life of Catholic Priests," and "Spiritual Christianity."

THEISS (tīs), or **Tirza,** a river in Hungary, which rises in the Carpathian Mountains and, after a course of 825 miles, joins the Danube about twenty miles above Belgrade. The source in the Carpathians is by two branches, the White Theiss and the Black Theiss, and its general upper course is toward the northwest, but it makes a bold curve in north central Hungary and flows toward the southwest, while its lower course is almost parallel to the Danube for 300 miles. The Körös and Maros are its principal tributaries. It is remarkably rich in fish and is navigable to Szolnok. The towns on its banks include Szegedin and Zenta.

THEMIS (thē'mĭs), in Greek legends, the goddess of justice, law, and order. She was the daughter of Cronus and Rhea and the wife of Zeus, and presided over the assemblies of the people and the laws of hospitality. Zeus frequently consulted her, owing to her great wisdom. She is represented in statuary in the full maturity of womanhood. In the right hand she holds the sword of justice and in the left the

scales, while her eyes are blinded by a bandage so the personality of the individual should carry no weight with respect to the dispensation of justice. In more recent Greek writings Themis is represented as a daughter of Uranus and Gaea, but all agree that she possessed the gift of prophecy.

THEMISTOCLES (thĕ-mĭs'tō-klēz), general and statesman of Athens, born about 514; died in Magnesia, Asia Minor, about 449 B. C.

THEMISTOCLES.

He descended from an obscure family, but received a liberal education, and in 484 B. C. rose to the leadership of political affairs in Athens. He was the opponent of Aristides the Just, whom he succeeded in the leadership, and immediately engaged workmen to construct a powerful fleet to oppose an invasion of the Persians. This fleet he commanded in the battles of Artemisium and Salamis, in 480 B. C., where the Persians were defeated with great loss, though he intrusted the chief command to Eurybiades, a Spartan. This victory caused his fame to rise with remarkable rapidity and he was intrusted with the most important public offices, but personal aggrandizement caused him to be exiled in 471 B. C. He first sought refuge in Argos, but soon fled on account of being charged with treason, and found favor at the court of Artaxerxes, King of Persia. At the Persian court he learned the language and usages of Persia and was later appointed to the government at Magnesia, where he remained until his death. A monument was erected to his honor at Magnesia, but his bones were afterward taken to Attica. Nepos and Plutarch wrote the history of his life.

THEOCRACY (thē-ŏk'rà-sỹ), a form of government in which men recognize the immediate sovereignty of God and receive his revelations as civil law. The most famous example of a theocracy is that of the Israelites, to whom the law was given by God through Moses, and it continued to be the form of Hebrew government until the time of Saul. In such a government the priesthood or a class of ecclesiastics become the interpreters of the divine commands and serve as the officers both in political and ecclesiastical matters.

THEOCRITUS (thĕ-ŏk'rĭ-tŭs), eminent Greek poet, born in Syracuse, Sicily, and flourished about 275 B. C. Little is known of his life aside from what was mentioned by other writers, but numerous productions of value are attributed to him. He visited Alexandria, Egypt, in the time of Ptolemy Soter, where he studied and began to write essays. Ptolemy Philadelphus, who assisted his father, Ptolemy Soter, in the Egyptian government, patronized him and mentioned him favorably in three of his poems. Subsequently he lived at the court of Hiero II., of Syracuse, where he spent much time in writing historical accounts of Sicilian life and essays and poetry. His idyls of Sicilian life include about thirty. He is the author of twenty-two epigrams and a poem entitled "Berenice."

THEODOLITE (thĕ-ŏd'ô-līt), an instrument used in surveying for measuring angles, both horizontal and vertical, that is, altitude and azimuth. It consists of a small telescope, which can be moved up and down, and the inclination is shown by a graduated circle called the *altitude circle*. In most instruments the telescope is so mounted that it can be twisted around a vertical axis so as to permit measuring the angular distances of objects of the north point, that is, azimuth. Various forms of construction have been followed in making these instruments, depending upon whether they are to be used in astronomical or other measurements. Railroad surveyors usually employ the transit instead of the theodolite.

THEODORIC (thĕ-ŏd'ô-rĭk), King of the Ostrogoths, born near Vienna, Austria, in 455; died in 526 A. D. He was the son of Theodemir, King of the Ostrogoths, and in 475 succeeded his father on the throne. His early life was spent at Constantinople, where he was a hostage at the court for ten years, and there received special training in connection with the children of Emperor Leo. He returned to his native country in 473 and immediately demonstrated his ability as a warrior and military tactician by securing concessions in Dacia and Moesia, and on the death of his father, in 475, was hailed as the chief of his valiant but warlike kinsmen. A war soon broke out between the Ostrogoths and Zeno, emperor of the Eastern Empire from 471 to 491, but the latter saved his capital by persuading Theodoric to invade Italy against the usurper Odoacer, which he did in 488 with an army of 200,000 men. The Ostrogoths were successful near Aquileia in 489, and the following year surrounded the enemy in Ravenna, which they captured after a siege of three years, and Odoacer was treacherously murdered at a banquet in 493. Theodoric immediately assumed the title of King of Italy, which he governed with remarkable vigor and ability, and successfully resisted the claim of a protectorate preferred by the Eastern emperor. The Franks were expelled from the territory belonging to the Ostrogoths, an insurrection was quelled in Spain, and material improvements were fostered in the civil and industrial affairs of Italy. Though an Arian, he tolerated all forms of Christianity, patronized learning, and established an efficient system of justice. In his long reign of 35 years Italy prospered more substantially than it had for some

centuries before. He is mentioned as Dietrich of Berne in the "Nibelungenlied."

THEODOSIUS (thē-ō-dō'shĭ-ŭs), surnamed *The Great,* Emperor of Rome, born near Segovia, Spain, about 346; died Jan. 17, 395 A. D. He was a son of the eminent Roman general Theodosius, whom he accompanied on a campaign through France and Britain in 368, and assisted in expelling the Caledonians from South Britain. His father was murdered at Carthage, in 376, and Theodosius routed the Sarmatians in Moesia, but soon after retired to his estate in Spain. Emperor Gratianus called him from retirement in 379 and made him governor of Dacia, Macedonia, Thrace, Egypt, and the East. Soon after he expelled the Goths from the Eastern provinces, and concluded a peace with them in 382. Later he won the friendship of the Goths by treating them, while his captives, with marks of kindness, and many of the warriors joined his army.

Gratian, ruler of the Western Empire, had been murdered in 383 and his throne had been seized by Maximus, but Theodosius, in 387, undertook to restore the throne to Valentinian II., brother of Gratian, which he accomplished by capturing and putting to death the usurper at Aquileia. However, Valentinian was strangled in 392 by General Arbogastes, and Theodosius made a second invasion of Rome, defeating and slaying Arbogastes in a decisive battle. Thus elevated to mastery of the whole Roman Empire, he practiced great cruelty in suppressing an insurrection in Thessalonica, in which 7,000 people were ruthlessly murdered by his soldiers in an amphitheater. Though a Christian, he was refused communion by Saint Ambrose on account of this crime until after being humiliated for eight months. The empire was left to his two sons at his death, Honorius receiving the western portion and Arcadius the eastern.

THEOLOGY (thē-ŏl'ŏ-jў), a term employed by classical authors to describe treatises on the nature and worship of the gods, such as Hesiod's "Works and Days" and Cicero's "Natura Deorum." It is now applied to the science which treats of God and the relations of God and man, and has special reference to the present condition and ultimate destiny of mankind. The two generally recognized divisions are *natural,* or *philosophical,* theology, which seeks a knowledge of God through the light of nature and reason, and *positive,* or *revealed,* theology, which embraces and systematizes the doctrines contained in the various books of the Bible. The theologies of all Christian churches are based chiefly on the New Testament. The earliest interpretation of the New Testament doctrines was made by the Apostolic Fathers, and later by the so-called Fathers of the Church. Doctrines were stated primarily in general terms and subsequently they were expounded by theologians, but ultimately clear and precise form was given to them by decisions promulgated through councils. *Protestant theology* had its beginning with Luther and Zwingli, who asserted their right to interpret Scripture by private judgment. On the other hand, the theology of the Catholic churches is founded on the consensus of the fathers, on council decisions, and opinions promoted by the pontiffs. For this reason it is based less directly on individual investigations than that of the Protestants.

THEOPHRASTUS (thē-ō-frăs'tŭs), Greek philosopher, born at Eresus, in Lesbos, in 322; died in 287 B. C. He studied at Athens under Plato and Aristotle and became the successor of the latter in the lyceum. As the head of the Peripatetic school of philosophy he attracted several thousand students from all parts of Greece, and by his popularity and influence excited the jealousy of a strong party against him. At one time he was brought before Areopagus on a charge of impiety, but he plead his own cause so ably that he was acquitted. He did not develop a new system of philosophy, but expounded that of Aristotle. Although he is the author of many works on law, oratory, legislation, and traits of human character, practically all have been lost. Several of his works on botany are extant, and one of his treatises on character is in existence. The latter contains sketches from the mimic life of the stage, and many editions of it have been issued.

THEOSOPHY (thē-ŏs'ŏ-fў), a term applied to a so-called sacred science. It differs from the science of philosophy and theology in that it professedly derives its knowledge of God from immediate communications with the Deity, instead of generalizing from phenomena to the being and attributes of God, as in philosophy, and instead of contenting itself with the relations of the soul to God, as in theology. Theosophy is closely related to mysticism, although the latter includes more in its scope. It dates from remote antiquity, but in its newer application arose from the organization of the Theosophical Society founded by Colonel Alcott in New York in 1875, who advocated the formation of a universal brotherhood. The tenets of modern theosophy are best set forth in "The Secret Doctrine," published by Madame Blavatsky, a Russian writer.

The theosophists teach that man possesses elements of essential divinity, but that the underlying principle of all manifestation is infinite and eternal and may be known through its spiritual and material manifestations. Throughout the universe, embracing the physical, mental, psychic, and moral planes, run a unity of consciousness and a unity of law. Some of the leading supporters of this system of thought hold that the divine principle manifests itself through occult phenomena, in which respect their tenets are somewhat allied to spiritualism. The Universal Brotherhood is an outgrowth of the Theosophical Society and was founded in New York, Jan. 13, 1898, by Katharine A. Tingley.

It teaches the study of ancient and modern religion, philosophy, art, science, the divine powers in man, and the law of nature. At present the American section has 3,250 members, confined largely to the United States and Canada, and affiliated organizations are maintained in nearly all the countries of Europe.

THERAPEUTAE (thĕr-ă-pū'tē), an ascetic sect among the ancient Jews, sometimes closely associated with the Essenes. They had their seat near Alexandria, in Egypt, and were ardent as students of the law of Moses. In their religious work they were secluded, spending much of the time in meditation. They are described in a treatise by Philo, who credits them with observing the Sabbath and other Jewish festivals.

THERAPEUTICS, the branch of medicine which treats of the action of drugs and other remedies upon the diseased system, or the means that may be used in assisting nature to restore health. It embraces a knowledge of the nature of diseases and the drugs or curative agents to be employed in treating them. Such knowledge is obtained by experimental investigation on animals as well as man, and the facts learned are to be considered in applying the remedies in treating the diseases common to mankind. The subject has been divided into *rational therapeutics* and *natural therapeutics,* the former having reference to the action of drugs as curative agents and the latter proposing to cure disease more particularly through natural laws. In the former the physician aims to apply remedies for their specific effect, while in the latter he supports the strength of the patient by administering food as a part of the mode of treatment. The term *electro-therapeutics* has come into use through the application of electricity in medicine. Where a physician attempts to treat the symptoms rather than the causes, the practice is said to be *symptomatic therapeutics.* Any remedy that is known to cure a disease, as quinine in the treatment of malaria, is termed a *specific.*

THERESA (tē-rē'sȧ), **Saint,** or **Teresa,** the favorite saint of modern Spain, born in Avila, Spain, March 28, 1515; died Oct. 4, 1582. The death of her mother caused her father to place her in an Augustinian convent, but not with the view of leading a secluded religious life. However, she took the veil in a Carmelite convent in 1535, when she gave up her name of Theresa de Ahumada and assumed that of Theresa de Jesus. She was at first disappointed by the loose discipline in the order, and accordingly founded a convent of reformed Carmelite nuns at Avila in 1562. Subsequently she established 28 other convents of the reformed order, known as the Barefooted Carmelites. She wrote a history of her work in founding these convents, produced several writings of a devotional nature, and published an autobiography. Pope Gregory XV. canonized her in 1621.

THERMAL SPRING (thĕr'mąl), the name applied to any spring whose mean annual temperature is higher than that of the locality where it is located. Thermal or hot springs range from some found in localities of a cold climate, whose temperature may be a few degrees higher than the freezing point, to those whose waters are heated to the boiling point. The causes of such springs are found in the interior heat of the earth. They usually occur in volcanic regions, where the water flows through a portion of the earth's crust that is highly heated. In many instances these springs are found in districts that are not subject to volcanic eruptions, at least not in recent geological times, and in that case they may be assigned to the heating influences of gaseous emanations from the interior of the earth. Many of the thermal springs have medicinal properties, while others yield minerals of value, such as sulphur, salt, or magnesia. Among the noted thermal springs are those of the Yellowstone National Park, Wyoming; the Rocky Mountain Park, Alberta; at Hot Springs, Ark.; and the geysers of Greenland.

THERMOELECTRICITY (thĕr-mō-ē-lĕk-trĭs'ĭ-tў), the branch of electrical science which treats of the properties and action of electricity developed by heat. If two bars of unlike metals, such as antimony and bismuth, or copper and iron, are soldered together at one end, the other end being connected by a conductor and heat being applied, an electro-motive force will be produced and a current of electricity will flow in a certain direction through the circuit so provided. A current of electricity will likewise be produced if the soldered end be cooled, but it will flow in an opposite direction. In practice, the face of the pile, as a number of thermo-electric couples thus formed are called, is turned toward the source of heat, such as a polarized beam from an electric lantern. A galvanometer is then placed in the circuit of the pile and equilibrated. Any increase or diminution of the temperature in the beam is at once shown by the movement of the galvanometer needle. Currents of electricity produced by a thermopile, or battery, will continue to flow as long as there is any difference of temperature between the opposite ends of the bar. While a single couple, or cell, as the simple arrangement is called, will produce a weak electric current, considerable force may be developed by a thermoelectric pile, or battery.

THERMOGRAPH (thĕr'mō-grȧf), an instrument for automatically recording variations of temperature. It consists essentially of some form of metallic thermometer, to which is attached a circular disc of paper, and a pen is so connected that it moves vertically over the surface of the sheet. In most instruments the sheet of paper is drawn horizontally by clockwork so attached that it makes a complete revolution in 24 hours. The surface of the paper disc is graduated into spaces indicating minutes and hours, and degrees of temperature are shown in the spaces set off by concentric circles. Since

the disc makes a complete circuit in a day, it is possible to read off the temperature at any given time. By replacing the disc daily and filing it for reference, a complete record of the temperature for a series of days may be preserved.

THERMOMETER (thĕr-mŏm'ĕ-tĕr), an instrument for measuring temperature, or the intensity of heat, by means of a gas or liquid. It is based on the property that heat possesses of expanding bodies. The expansion of matter is proportional to the degree of heat applied, but it varies greatly in different substances, being greatest in gases, less in liquids, and least in solids. A thermometer consists of a long, straight tube, with a small internal diameter, closed at the upper end and widened at the lower end into a bulb of cylindrical shape. The bulb contains a quantity of mercury and the small internal bore or diameter, which must be of equal size throughout, is exhausted so as to produce a vacuum. The mercury rises in the tube when the thermometer is taken into a warm place, owing to the expanding influence of the warmer surroundings, but it contracts when taken into a cold place, thus causing it to fall in the tube.

In making a thermometer, the tube is first carefully formed, and the bulb and part of the tube are filled with cold mercury before the tube is closed at the top. The bulb is carefully heated a little hotter than the highest degree of heat to be indicated by the instrument, thus causing a portion of the mercury to flow out at the top, thereby driving out all the air. The upper end of the tube is sealed before being cooled, which is done by being melted in the flame of a blowpipe. A vacuum is left in the tube as the mercury cools and accumulates in the bulb. The tube is next graduated, or marked off into degrees. This is done by placing it into boiling water and afterward in contact with melting ice, thus ascertaining the *boiling* and *freezing* points. These points are marked off into degrees, and the parts of the tube below the freezing point and above the boiling point are similarly divided into degrees of the same length.

Three kinds of thermometers are in general use at present. They are the Fahrenheit, Reaumur, and Centigrade. The *Fahrenheit* thermometer, invented by the German physicist, Gabriel Daniel Fahrenheit (1686-1736), is in general use in America and the countries under the government of Great Britain. In this thermometer the freezing point is marked 32° and the boiling point, 212°. The inventor placed zero 32° below the temperature of freezing water because he considered that to be absolutely cold, but that point is now estimated at 492° below the freezing point according to his scale. In the *Reaumur* scale the freezing point is marked zero and the boiling point is 80°. It is the thermometer used in Germany. The *Centigrade* thermometer is at present in general use among the scientific men all over the world and in most European countries. The freezing point in the Centigrade scale is zero and the boiling point, 100°.

Degrees on all thermometers above zero are termed + degrees, while those below zero are termed — degrees. Mercury can be employed in the Fahrenheit scale only between —40° and +661°, since it freezes at 40° below zero and boils in a temperature raised to 661°. Alcohol colored red is therefore used in thermometers designed to register low temperatures, being serviceable in a pure state to indicate temperatures exceeding —100°, but it is of less value than mercury in registering high temperatures, since its boiling point is much lower. Self-registering thermometers are designed to record the highest or lowest temperatures reached within a certain period, and to this class belong instruments that record all the changes undergone at different times. To reduce degrees of one scale to those of another, the following formula will serve, the respective scales being represented by the initial letters:

$$C=\tfrac{5}{9}\ (F-32)=\tfrac{5}{4}\ R.$$
$$F=\tfrac{9}{5}\ C+32\ =\tfrac{9}{4}\ R+32.$$
$$R=\tfrac{4}{9}\ (F-32)=\tfrac{4}{5}\ C.$$

THERMOPYLAE (thĕr-mŏp'ĕ-lē), or **Pylae,** a famous pass mentioned in ancient history, the only one through which an invading army may pass from northern into southern Greece. It is situated south of the Sperchius River, forming a narrow passway between Mount Oeta and the Maliac Gulf. In its course are several hot springs, hence the name Thermopylae, meaning the Hot Gates. The Spartan king, Leonidas, made the pass famous in history by attempting to prevent the mighty Persian army under Xerxes, in 480 B. C., from overrunning southern Greece and capturing Sparta. His army numbered 7,000, but he selected a band of 300 Spartans to make a gallant stand against the invaders, who had been informed of the pass by a Thessalian. The defile was pointed out in the same way by a traitor to the Gauls under Brennus, who, in 279 B. C., forced the Greeks to retire. The pass has become widened by natural causes into a swampy plain, and is now of little importance as a strategic point.

THESEUM (thĕ-sē'ŭm), the name given by the Greeks to any building dedicated to Theseus. The largest and most celebrated temple sacred to him was located at Athens and appears to have occupied a site not far from the Acropolis. It was built about 473 B. C., when the remains of Theseus were removed from the island of Scyros to Athens. At present the name is applied to a temple on the west side of the ancient Agora, though it is not identified with the Theseum dedicated to Theseus. This structure is in the Doric style and is well preserved. Formerly it was used as a museum of art and history, but the interior has been remodeled as a Greek church. Many sculptures of note are within the building, taken chiefly from the myths of Theseus and heroes of the age of Pericles.

THESEUS (thē'sŭs), in Greek legend, a famous king of Athens, son of King Aegeus and his queen Aethra, noted for his heroism. His most famous exploit was that of slaying the Minotaur, thus freeing Athens from the obligation of sending annually seven youths and seven maidens to be devoured by the Cretan monster. Ariadne, daughter of King Minos of Crete, became enamored of Theseus, gave him a sword to kill the monster, and described the clue of thread with which to escape from the labyrinth. On leaving Athens he promised to display white sails in case he succeeded in his enterprise, thereby to give the people notice that he had succeeded, but in the moment of success his pledge was forgotten and the ship returned with its usual display of black flags. His father, seeing black instead of white flags, immediately hurled himself into the sea.

After Theseus ascended the throne of Athens, he conducted successful wars against the Amazons and the Centaurs and reorganized the Athenian festival. His government is described as one of mildness and popularity. He married Phaedra, sister of Ariadne. However, she fell in love with Hippolytus, the son of Theseus and Antiope, but, as the youth did not return feelings of affection, she accused him wrongfully to his father. In a fit of anger Theseus implored Neptune to destroy him, when Phaedra hanged herself in remorse. Sophocles and Euripides made the story of Phaedra the subject of a tragedy.

Theseus carried Helen from Sparta to Athens, which caused Castor and Pollux to imprison him in the underworld, and in his absence the Athenians revolted. He was finally killed on the island of Scyros by King Lycomedes, but his body was returned to Athens about 469 B. C. and was placed in the famous temple called *Theseum.* This temple served as a sanctuary for the poor and was a retreat for slaves when they were treated cruelly. The Greeks had a tradition that Theseus came from the spirit world and fought on the side of the Athenians in the Battle of Marathon.

THESSALONIANS (thĕs-sā-lō'nĭ-ąnz), **Epistles to the,** two books of the New Testament, addressed by Saint Paul to the church at Thessalonica. The first of these books was probably the earliest of all the epistles written by Saint Paul and was likely prepared while he was at Corinth, when Silas and Timothy had returned from Macedonia, about the year 52. It may be divided into two parts, one referring to the condition of religious work among the people to whom it is addressed, and the other instructing them in Christian duties and the fate of the dead at the expected return of Christ. The second epistle was written about one or two years later, and aims to correct some mistakes respecting the coming of Christ. Paul commends the Thessalonians for their patience and faith in their persecutions, and refers to the coming of the Antichrist prior to the return of Christ.

THESSALONICA. See **Salonica.**

THESSALY (thĕs'sā-lĭ), an important state in ancient Greece, the largest political division in that country. It occupied the region between the Pindus Mountains and the Aegean Sea, extending from the Khassia Mountains in the north and the Othrys Mountains in the south, corresponding nearly to the limits of the government of Thessaly in modern Greece. Within this region is the plain of Thessaly, supposed formerly to have been an interior lake, which is drained by the Salambria River (anciently the Peneus), and forms the most fertile tract of land in Greece. This region was originally occupied by the Aeolians, when it was called Aeola, but these inhabitants were divided into separate confederacies and subsequently were driven southward to Boeotia or reduced to serfdom. Philip of Macedon conquered Thessaly in the 4th century B. C. and in 344 B. C. made it subject to Macedonia. It was incorporated as a part of the Roman Empire in 197 B. C., fell to the Eastern Empire after the decline of Rome, and in 1355 A. D. came under the Turks. The Berlin Congress of 1878 restored the larger part of Thessaly to Greece, but additional annexations were made in 1881, thus giving Greece the larger part of the fertile region lying in the Salambria basin. It is traversed by several lines of railroad and has excellent cereal and fruit farms. Larissa is the capital.

THETIS (thē'tĭs), in Greek legends, the daughter of Nereus and Doris, the wife of Peleus, the mother of Achilles. Her marriage to Peleus was desired by the gods, who had predicted that her son would be greater than his father. The wedding was attended by all the gods except Eris, who became angered and as a revenge threw the apple of discord among the guests.

THEURIET (tĕ-ryā'), **Andrew,** poet and novelist, born at Marly-le-Roi, France, Oct. 8, 1833; died April 23, 1907. He studied law in Paris, was admitted to practice in 1857, and soon after entered the office of the ministry of finance, but, being of a literary turn of mind, contributed to magazines and wrote a number of poems and sketches. His "In Memoriam" was published in 1857. He was elected to the Academy in 1896. His chief works are "Reine des Bois," "Jean-Marie," "Frida," "La soeur de lait," and "La maison des deux Barbeaux."

THIAN SHAN (tē-ăn' shän), an elevated mountain system of Central Asia, which is situated in western China and extends into Turkestan. It trends a distance of 1,500 miles from east to west and contains many peaks towering 10,000 to 21,000 feet above the sea level. The loftiest summit is Tengri-Tagh, height 21,215 feet. Spurs of the Thian Shan Mountains penetrate into the Desert of Gobi. Many of their summits extend above the snow-line, but the slopes are well timbered.

THIBET. See **Tibet.**

THIERS (tyâr), **Louis Adolphe,** statesman and historian, born in Marseilles, France, April 16, 1797; died Sept. 3, 1877. He was the son of a locksmith and, after attending the lyceum in his native town, he studied law at Aix and began the law practice at Paris. His struggle for success was against poverty, but he soon abandoned law to take up the career of a journalist and writer. His first contributions to the press were published in the *Constitutionnel,* a political journal of Paris, and his productions on art, politics, and the drama were alike interesting. In 1823 he published the first two volumes of his "History of the French Revolution," a work that gained much popularity, of which the last two volumes were issued in 1827. This production ultimately brought him a fair income, which enabled him to found the *National,* a periodical devoted to the dissemination of democratic principles. He was largely instrumental in bringing about the Revolution of 1830, and rapidly rose to power and influence in the chamber of deputies.

In 1832 Thiers was made minister of the interior, in 1836 became foreign minister, and in 1840 was chosen president of the council. He resigned from the last mentioned position after serving six months and devoted himself to literature, and in the meantime visited the scenes of historic battles in Germany, Spain, Austria, and Italy. He was elected to the assembly after the Revolution of 1848 and was an active supporter of Louis Napoleon for the presidency, but afterward became his opponent. His opposition to the formation of a new empire caused his arrest and banishment in 1851, but he returned to France and lived in retirement until 1863, when he again entered the assembly as deputy. He opposed the war with Germany in 1870, predicting disaster to France, but vigorously supported the conflict after it had begun. In 1871 he was elected to the national assembly of the new republic, being at once appointed to exercise executive power, and on Aug. 31, 1871, was given the title of president. He directed public opinion in favor of permanently organizing a government in the form of a republic, but opposition to his advanced position caused his retirement from office. Thiers was made a member of the French Academy in 1836. His writings include an autobiography. His chief works are "The Consulate of the Empire" and "History of the French Revolution."

THIRLWALL (thĕrl'wąl), **Connop,** historian, born in London, England, Jan. 11, 1797; died July 27, 1875. He studied at Trinity College, Cambridge, where he became a fellow and tutor after graduation, in 1818. Subsequently he studied law and was called to the bar. In 1828 he took orders in the Church of England. He was made rector of Kirby Underdale, Yorkshire, and soon began to give attention to literary work. In 1840 he was made bishop of Saint Davis, in Wales, where he conducted services in the Welsh tongue. His chief historical work is "The History of Greece," a work published in eight volumes. He made a translation of Schleiermacher's "Critical Essay on the Gospel of Saint Luke" and Niebuhr's "History of Rome." His "Letter to a Friend," a fine literary product, was edited by Dean Stanley.

THIRST, the sensation caused by the need of water in the body, which is relieved by drinking. It is accompanied by febrile excitement and usually by excessive heat, and is followed by a sensation of fatigue and weakness. The excessive use of salt is a familiar cause of thirst and is explained by the presence of too much salinity of the blood. Some diseases, such as diabetes and cholera, are accompanied by great thirst. The craving for water while in a state of thirst is explained by a reduction in volume of the fluids of the body, and these are more saline under such a condition. Relief may be obtained not only by drinking water, but also by injecting fluids into the veins. Drinks that contain a small quantity of acid are most effective in relieving thirst, since they stimulate the action of the salivary glands.

THIRTY TYRANTS, the name of a body of rulers in Athens, who were chosen as magistrates after the close of the Peloponnesian War, in 404 B. C. They were native Athenians of the aristocratic party, and were chosen by the conquering Spartans with the hope that their government would prove unpopular to the democracy. These rulers were cruel and oppressive in their official acts and after one year they were expelled under Thrasybulus, who had been exiled by them. As a result of the Battle of Piraeus, in which he commanded, the democratic form of government was restored to Athens.

THIRTY YEARS' WAR, the name of a conflict in Central Europe, whose seat was chiefly in Germany. It was a struggle between the Protestants and Roman Catholics for supremacy, and extended from 1618 until 1648. The Treaty of Augsburg, concluded in 1555, had virtually ended the Reformation, and by its terms each of the states was permitted to choose its national religion. It had been planned to provide regulations under which each state might have uniform religious interests, hence all subjects were permitted to remove to states where their faith was sanctioned officially, but the inconveniences of removals overcame the desire for settling elsewhere than in the states to which the parties interested were subject. Differences in questions of government soon arose, and the growing strength of Protestantism in Bohemia and Austria caused a reaction to set in under the influence of the Jesuits. As a means of mutual protection, the Evangelical Union was organized by the Protestants in 1608, and the Catholic League, or Holy League, was formed the following year. Ferdinand of Styria, who had been educated by the Jesuits, became King of Bohemia in 1617.

He immediately showed favors to the Catholics and caused many of the Protestant churches to be closed. In 1618 the Protestant estates petitioned Emperor Matthias of Austria for relief, but that monarch declared their meeting illegal.

The Protestants, under the leadership of the Count of Thurn, on May 23, 1618, expelled two representatives of the emperor from the royal palace at Prague. This action was taken as a protest against the infringement of the crown against religious liberty and was the immediate occasion of the beginning of the war. Both Protestants and Catholics took up arms in defense of their faith. The concessions to Protestants in Bohemia were withdrawn by the authorities, and this act was immediately followed by an uprising. In 1619 the Protestants chose Frederick V., the elector Palatine, as King of Bohemia. The Catholic forces were repeatedly defeated by Count Thurn, but Maximilian of Bavaria defeated him at Weissemberg in 1620. An army of Spaniards under Spinola came to the relief of the Catholics, and the defeat of the Protestants upon the field was followed by persecution.

The seat of war was carried farther west immediately after the Protestant losses in Bohemia and for some time had its center in the Palatinate. The Protestant forces under Count Mansfeld were successful in holding their position on the Rhine, where they retaliated in 1621 for the tyranny shown by Ferdinand II. of Austria, formerly King of Bohemia. However, Tilly, the imperial commander, gained a victory at Wimpfen, in 1622, and the following year defeated the Protestants at Höchst and Stadtlohn. The war would likely have ended with these victories, but the Protestant princes in the north, fearing the growth of Catholic influence in the southern part of Germany, became aroused.

Christian IV., King of Denmark, joined the Protestant cause in 1624. He was supported by Holland and a British subsidy. His forces joined those of Mansfeld and Christian of Brunswick, and these forces took strong positions in Lower Saxony. Emperor Ferdinand was supported by two noted commanders, Wallenstein, the commander of the imperial army, and Tilly, the leader of the Holy League. In 1626 the Danes were defeated at Lutter by Tilly and at Dessau by Wallenstein. They overran Denmark and the northern part of Germany and Christian IV. was compelled to sign a treaty of peace at Lubeck in 1629. In the meantime Mansfeld gathered a powerful army and conducted a vigorous campaign in Moravia and Hungary.

The Swedish-German period of the war began in 1630, when Gustavus Adolphus, King of Sweden, came with a powerful army into Germany as a support to Protestantism. Ferdinand of Austria had previously ordered the restitution of certain estates to the Catholic church, an edict that was unpopular among many Catholics and an offense to the Protestants. The Swedish army landed at Usedom and drove the imperialists out of Mecklenburg and Pomerania, and the Swedish king concluded alliances with a number of German states, including Hesse, Brandenburg, and Saxony. Tilly captured Magdeburg in 1631 and permitted the city to be plundered and many of the inhabitants to be slaughtered. The armies met near Leipzig, at Breitenfeld, where Tilly was defeated with great loss. Gustavus followed up his victory by advancing toward the south and east, and defeated his enemy on the Lech, in 1632, where Tilly was slain. His plan of campaign included the establishment of powerful organizations as a support to his cause, and Sweden soon became the head of the Evangelical Union. Wallenstein had been previously disgraced, but Ferdinand now recalled him as a means of checking the powerful advance of the Protestants. He promptly invaded Saxony, where the armies met on the field of Lutzen, in 1632. While Wallenstein was signally defeated, the Protestants sustained an irreparable loss in the death of Gustavus Adolphus, who was slain at the moment of victory. Oxenstierna now succeeded to the command of the Swedish army and sustained the advantages gained until 1634, when the Protestants under Bernard of Weimar were defeated at Nördlingen.

The French-Swedish period of the war began in 1636, when Richelieu joined the Protestant forces to defeat the ambitions of Austria. France thus became united with Sweden and Richelieu was given general direction of the war, but the conquest now became political rather than religious, and Denmark and Saxony united with Austria. Northern Germany was held by the Swedes under Banér, who defeated an army of Saxons and Austrians at Wittstock in 1636. Later the same army gained victories at Breitenfeld in 1642 and at Jankau in 1645. Another army under Condé and Turenne gained repeated victories in the regions of the Rhine and forced the opposing army to leave the Palatinate and Bavaria. It was planned to conduct a general invasion of Austria, but the different governments had been endeavoring to bring the war to a close, which was finally accomplished in 1648 by the Treaty of Westphalia. Protestantism was saved by the most terrible war of modern times, but at a cost that is astounding. Many provinces of Germany were devastated and the population was greatly decreased. From the effect of this contest Germany recovered only after a period of two centuries. See **Reformation.**

THISTLE (thĭs"l), an extensive genus of plants of the aster family. Some of these plants are troublesome weeds in many sections of Canada and the United States, where about thirty species have been described. They have prickly leaves and tubular flowers in a hairy receptacle. A tuft of hairs surmounts the seeds. Some species bear beautiful flowers, but the plants are looked upon as obnoxious, owing to their roots being too deeply seated to be plowed

up, and because small particles broken from the parent stalk grow and produce new plants. The *Canadian thistle* is one of the most troublesome. It appears early in the spring, growing from the perennial rootstock, but the growth is most rapid in midsummer. Many states and provinces have enacted laws requiring owners of land to uproot and destroy it. The *Scotch thistle, pasture thistle, milk thistle, carline thistle,* and *cotton thistle* are other species that are widely distributed.

The thistle was adopted as the national emblem of Scotland in the reign of James III.

SCOTCH THISTLE. CANADIAN THISTLE.

Coins of that country formerly bore the Latin motto, *Nemo me impune lacessit,* meaning no one touches me with impunity. James VII. of Scotland instituted the Order of the Thistle in 1687. It fell into abeyance during the reign of William and Mary, but was revived in 1703 by Queen Anne and is now one of the recognized orders of Great Britain.

THISTLE, Order of the. See **Thistle.**

THOMA (tō'mà), **Hans,** painter and illustrator, born at Bernau, Germany, in 1839. He studied art at the Karlsruhe Academy and subsequently pursued courses at Düsseldorf and Paris. Afterward he spent four years in Munich and later went to Italy. In 1899 he became principal of the academy and gallery at Karlsruhe. Besides producing many portraits and landscape paintings, he treated religious and allegorical subjects and did considerable work in illustrating and lithographing. His productions show great originality and power of imagination, and his lithographs are especially valuable for their decorative effect. Among his chief paintings are "An Open Valley," "The Keeper of the Garden of Love," "Landscape with Children," and "A Taunus Landscape." He died Nov. 7, 1924.

THOMAS, George Henry, soldier, born in Southampton County, Virginia, July 31, 1816; died in San Francisco, Cal., March 28, 1870. After graduating from the West Point Military Academy, in 1840, he was commissioned lieutenant and sent against the Seminole Indians in Florida. Subsequently he served in California and Texas, and in the Mexican War gained distinction in the battles of Monterey and Buena Vista. He remained in the southwest until 1849, when he went to Florida for two years' service, and in 1851 became instructor of artillery and cavalry in West Point. At the beginning of the Civil War he was assigned to a division in the army of the Ohio, but soon after was transferred to the army of the Cumberland, with which he fought with distinction in Alabama, Kentucky, and Tennessee. In 1862 he took part in the Shiloh campaign and in the Battle of Stone River, and the following year became brigadier general with command of the army of the Cumberland.

Thomas had the leading part in the Battle of Chickamauga, and for his gallantry became known as the "Rock of Chickamauga." While commanding in the army of the Cumberland, he rendered efficient service in Sherman's march to the sea, and at Nashville defeated the Confederates under Hood in 1864. This battle contributed largely to hastening the end of the war. His services were rewarded by promotion to the rank of major general and by a gold medal on the first anniversary of the battle, presented by the State of Tennessee. He had charge of the military district of Tennessee until 1867, when he was assigned to the third military district, and in 1869 was transferred to the district of the Pacific, his headquarters being in San Francisco. A promotion to the rank of lieutenant general was tendered him in 1868, but he declined. He was buried with the honors of his rank at Troy, N. Y. At Washington, D. C., is a fine equestrian statue in bronze, erected to his honor by the soldiers of his army.

THOMAS, Joseph, lexicographer, born in Cayuga County, New York, Sept. 23, 1811; died in Philadelphia, Dec. 24, 1891. After studying at the Rensselaer Polytechnic Institute and Yale University, he took a medical course in Philadelphia, and spent three years in India and Egypt studying Oriental languages. On returning to America, he became professor of Greek and Latin at Haverford College, Pennsylvania, and in the meantime produced a number of important writings. The best known of his works include "Universal Pronouncing Dictionary of Biography and Mythology," "Travels in Egypt and Palestine," and "Comprehensive Medical Dictionary." His brother, John J. Thomas (1810-1895), was an eminent writer on agriculture. He became an editorial writer on the *Genesee Farmer,* in 1834, and afterward on the *Country Gentleman* and on the *Albany Cultivator.* He published "Farm Implements and the Principles of Their Construction and Use" and "Fruit Culturist." He edited the *Annual Register of Rural Affairs.*

THOMAS, Lorenzo, soldier, born at Newcastle, Del., Oct. 26, 1804; died March 2, 1875. He graduated at the United States Military Academy, West Point, in 1823, and served against the Indians in Florida. During the Mexican War he was chief of staff to William O. Butler and in 1852 became lieutenant colonel. In 1861 he was promoted to the rank of a colonel and placed in charge of the adjutant general's office at Washington, but the same year became brigadier general in the army. During the latter part of the war he had charge of organization work among colored troops. President Johnson appointed him Secretary of War in 1868, but Secretary Stanton refused to vacate, hence he did not enter upon the duties of the office. He was retired from active service in 1869.

THOMAS, Saint, one of the twelve disciples of Christ. His name is associated with the list of apostles by Matthew and other writers, and he is represented as possessing great devotion for his Master, but he refused to believe in the resurrection of Christ until he came in personal contact with Jesus, hence he is called *Doubting Thomas.* Tradition makes him the evangelist of Parthia and Edessa. The Christians of Saint Thomas constitute a religious sect in southern India, claiming Saint Thomas their founder. A colony of this sect was conducted by a certain Thomas of Jerusalem to the Malabar coast in 345 A. D., where his adherents have since lived and increased in numbers.

THOMAS, Theodore, musical conductor, born at Esens, Germany, Oct. 11, 1835; died Jan. 4, 1905. He received early instruction from his father, who in 1845 removed with his family to the United States. His first appearance in public was at the early age of six years. After coming to America, he played violin solos at New York concerts for two years and subsequently traveled in the Southern States. In 1851 he returned to New York to play as a principal violinist at concerts and operas, but in 1861 became an orchestra leader. He was made director of the College of Music at Cincinnati in 1878, but resigned two years later to become conductor of the New York Philharmonic Society, and in 1891 established his orchestra at the Chicago Auditorium. He was musical director at the World's Columbian Exposition in 1893. His musical concerts given in various cities were popular and he probably did more to raise the standard of music in America than any other person.

THOMAS à KEMPIS. See **Kempis.**

THOMASVILLE (tŏm′ạs-vĭl), a city in Georgia, county seat of Thomas County, 200 miles southwest of Savannah, on the Atlantic Coast Line and other railroads. The surrounding country is fertile, producing large quantities of cotton, sugar cane, cereals, and fruits. The features include the public library, the post office, the public high school, a number of private schools, and churches of all denominations. It is noted as a winter and health resort. Among the manufactures are flour, fertilizers, cotton-seed oil, furniture, hardware, cigars, and farming implements. It has a growing trade in cereals and merchandise. Population, 1900, 5,322; in 1920, 8,196.

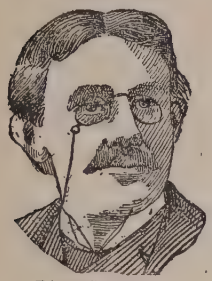
THOMPSON (tŏmp′sŭn), **David,** explorer, born in Westminster, England, April 30, 1770; died Feb. 16, 1857. He studied in London and at Oxford and emigrated to Canada in 1789. For some time he was in the service of the Hudson Bay Company. In 1798 he discovered Turtle Lake, which he claimed to be the source of the Mississippi, and later aided in surveying the south shore of Lake Superior. He crossed the Rocky Mountains through a defile, now known as the House Pass, in 1817, and four years later ascended the Columbia River from the junction of the Canoe to its source. In 1832 he surveyed the northern shore of Lake Superior and two years later surveyed Lake Francis. Subsequently he made a survey of Lake Saint Peter and surveyed a route from Lake Huron to the Ottawa River. His services to the government as an explorer were of great value.

THOMPSON, Denman, actor, born at Girard, Pa., Oct. 15, 1832. His boyhood was passed in Swanzey, N. H., where he came in contact with the rustic types that made him famous. In 1852 he made his début as an actor at Lowell, Mass. His successes are based largely upon his success in the comedy entitled "Joshua Whitcomb," which was afterward remodeled as "The Old Homestead." This play was presented four seasons successively in New York City, and was equally popular in the leading cities of America. He died April 14, 1911.

THOMPSON, George, abolitionist, born in Liverpool, England, in 1804; died in 1878. He began to advocate the abolition of slavery in 1833, when he published a number of pamphlets and delivered many lectures. His active work caused the abolition of the system of apprenticeship and was influential in obtaining the freedom of the slaves. In this work he was associated with Garrison and other abolitionists in the United States, in which country he traveled and organized many antislavery societies. From 1847 until 1852 he was a member of Parliament. He is a prominent figure in opposing the Corn Laws and in promoting better government for the people of India.

THOMPSON, James Maurice, author, born in Fairfield, Ind., Sept. 9, 1844; died Feb. 15, 1901. His early life was spent in the mountains of Georgia, half way between Chattanooga and Atlanta, where his father removed and became an extensive planter. He was educated under private tutors and in the public schools. In 1862 he entered the Confederate army, rendering efficient service as a scout until the war terminated with the surrender of General Lee. Soon after

the close of the war he went to Indiana as civil engineer on a railroad and while engaged at that work met Alice Lee, whom he married, and settled at Crawfordsville. Subsequently he entered upon a successful law practice and in 1879 was elected to the State Legislature. He was State geologist from 1885 to 1889.



JAMES MAURICE THOMPSON.

Thompson was self-educated and a writer of much success, both in prose and poetry. He was a scholar of Latin and Greek and knew the literature of France like a Frenchman. He was a genial companion, a fine conversationalist and a brilliant writer. In 1867 he explored Lake Okeechobee, Florida, listing its birds, plants, and animals. It may be said that he was ever a lover of nature, a genius of many parts. His writings began in 1873, when he published his poem "At the Window" in the *Atlantic Monthly*. His other writings include "Hoosier Mosaics," "Bird Notes," "Witchery of Archery," "Boys' Book of Sports," "Songs of Fair Weather," "Sylvan Secrets," "Story of Louisiana," "Ethics in Literary Art," "A Fortnight of Folly," "Lincoln's Grave," "Alice of Old Vincennes," "Byways and Bird Notes," "King of Honey Island," "A Tallahassee Girl," and "At Love's Extreme."

THOMPSON, Joseph Parrish, clergyman and author, born in Philadelphia, Pa., Aug. 7, 1819; died in Berlin, Germany, Sept. 20, 1879. After graduating from Yale University and Andover Theological Seminary, he became pastor of a Congregational church in New Haven, but soon after began a long and successful pastorate in the Broadway Tabernacle Church, New York. His early writings were for the Brooklyn *Independent* and later he became a contributor to the *North American Review*. He traveled in Egypt, Arabia, Palestine, and other Oriental countries from 1852 to 1853. In 1872 he became a resident of Berlin, Germany, where he resided until his death. His writings include "Man in Genesis and Geology," "Lectures to Young Men," "Church and State in the United States," "Egypt, Past and Present," "Christianity and Emancipation," "The Workman," "Theology of Christ, in His Own Words," and "Christian Graces."

THOMPSON, Launt, sculptor, born in Abbeyleix, Ireland, Feb. 8, 1833; died Sept. 26, 1894. He came to the United States at an early age and studied anatomy in Albany, N. Y., but had the advantage of a course in a medical college. Subsequently he took up the study of sculpture under Erastus D. Palmer, with whom he worked nine years. In 1858 he removed to New York, where he became an associate of the Academy of Design the following year. He studied in Italy in 1868 and in 1875. The works of Thompson are celebrated for remarkable grace and beauty, and his talent for portraiture is especially noted. Yale University conferred the degree of master of arts on him in 1874. Among his productions are a portrait bust of William C. Bryant, in the Metropolitan Museum of Art, New York; a statue of Winfield Scott, at the Soldiers' Home, Washington; and a soldiers' monument at Pittsfield, Mass. Other works of note include statues of Napoleon I., Abraham Pierson, and John Sedgwick. His bust known as "Elaine" and his medallion entitled "Morning Glory" are works of beauty.

THOMPSON, Richard Wigginton, statesman, born in Culpeper County, Virginia, June 9, 1809; died Feb. 9, 1900. He attended the public schools in his native county, removed to Kentucky in 1831, and afterward settled in Indiana, where he was admitted to the bar in 1834. In the same year he became a member of the State Legislature and in 1836 was elected to the State senate. He served in Congress from 1841 to 1843 and again from 1847 to 1849 and was a presidential elector on the Republican ticket in 1864. In 1867 he became a circuit judge in his State, serving until 1869, and in 1877 entered the Cabinet of President Hayes as Secretary of the Navy. He resigned that position in 1881 to become chairman of the American committee of the Panama Canal Company, and soon after became a director in the Panama Railroad Company. He took high rank as a clear and forcible speaker and is the author of several important works, including "History of the Tariff" and "Papacy and Civil Power."

THOMPSON, Robert Ellis, educator, born near Largan, Ireland, April 5, 1844; died in 1924. In 1857 he settled in Philadelphia, Pa., where he attended school. He graduated at the University of Pennsylvania in 1865 and was ordained minister by the Reformed Presbyterian Church in 1868, when he became professor of Latin and mathematics in the University of Pennsylvania. He was elected principal of the Philadelphia high school in 1894. From 1870 to 1881 he was editor of the *Pennsylvania Monthly*, and subsequently edited the *American Weekly*. Besides contributing to a number of encyclopedias, he published "Social Science and National Economy," "Divine Order of Human Society," "Political Economy for High Schools," "Protection to Home Industry," and "History of the Presbyterian Church."

THOMPSONVILLE. See **Enfield.**

THOMSON, Elihu, American electrician, born in Manchester, England, March 29, 1853. He came to the United States in 1858 and studied electricity in Philadelphia, where he afterward taught chemistry in the high school. Subsequently he engaged as practical electrician in Connecticut and became the patentee of valuable apparatus for use in motor work, incandescent lighting, induction systems, and nu-

merous other purposes. He organized the Thomson-Houston Electric Company, with headquarters at Lynn, Mass., and was president of the American Institute of Electrical Engineers for some time. Several hundred patents were issued to him. He is the author of valuable treatises on the use and application of electricity.

THOMSON, James, poet, born in Roxburghshire, Scotland, Sept. 11, 1700; died near Richmond, England, Aug. 27, 1748. His father was a minister in the parish of Ednam, where he received his first instruction, and afterward studied at the University of Edinburgh. In 1725 he went to London, where he obtained a tutorship in the family of Lord Binning, but soon gave up teaching to engage in literature. His first poem of a series called "The Seasons" appeared in 1730. It was known as "Winter" and subsequently he published "Summer," "Spring," and "Autumn." "The Seasons" forms the basis for his literary reputation. It is written in an original style, gives a minute description of the phenomena of nature, and has been much read by foreigners. In 1740 he published, in conjunction with Mallet (1705-1765), "The Masque of Alfred," which contains the song, "Rule Britannia." "Tancred and Sigismunda" appeared in 1845 and "Castle of Indolence" was his last work. Other writings from his pen include "Edward and Elenora," "Agamemnon," "Sophonisba," "Liberty," and "Ode to the Memory of Sir Isaac Newton."

THOMSON, Sir William (Lord Kelvin), physicist and mathematician, born in Belfast, Ireland, June 25, 1824; died Dec. 17, 1907. He was the son of James Thomson, a lecturer on mathematics in Glasgow University, where he finished a university course, but afterward studied at Cambridge, graduating from the latter in 1845. In 1846 he became professor of natural philosophy at Glasgow University, serving in that capacity until 1896, when he retired, after holding the chair half a century. His first writings of extensive scope appeared in the *Cambridge and Dublin Mathematical Journal,* of which he was editor for many years. His treatise on "The Distribution of Electricity on Spherical Conductors" appeared in 1845, and his celebrated lecture on "Electrodynamic Properties of Metals" was published in 1885.

SIR WILLIAM THOMSON.

Sir William Thomson is best known for his eminent services in connection with the Atlantic cable and on its successful completion, in 1866, he was knighted and accorded other honors. Subsequently he aided in planning several minor submarine cables, invented valuable apparatus for taking deep-sea soundings with a steel pianoforte wire, and made important additions to our knowledge of heat, magnetism, and gases. He was made a baron in the peerage of the United Kingdom in 1894, and during his long and eventful career held many positions of honor in scientific associations, among them the presidency of the British Association in 1871. His publications include "Geology and General Physics," "Popular Lectures and Addresses," "Constitution of Matter," and "Navigatorial Affairs." He joined Professor Tait, of Edinburgh, in publishing a treatise on "Natural Philosophy."

THOR (thôr), in Scandinavian legends, the god of thunder and the ruler of the winds and the seasons. He is represented as the son of Odin and Frigga. It is reputed that he had his home in a palace called Thrudwanger, where he received the gallant warriors that had fallen in battle. Thunder was caused by the noise of his chariot wheels, which vehicle was drawn by he-goats. The thunderbolts were hurled at the monsters and giants, but the family and agriculture were carefully protected by him. He bore a hammer as an ensign, which, after being hurled at his victims, always returned to his hand. A belt of magic impulses worn about his waist continuously renewed his strength for battle, thus making him ever active and powerful. Thor is spoken of in the *Eddas* as the champion of men and gods, and Thorsday, or Thursday, the fifth day of the week, is named for him.

THORACIC DUCT (thō-răs'ĭk), the largest lymphatic vessel of the human body. It extends from the *receptaculum chyli,* the vessel in which the contents of the lacteals are collected, to the junction of the left internal jugular and the left subclavian veins, passing upward on the left side of the spinal column. This duct is from eighteen to twenty inches long, is about one-eighth of an inch in diameter, and has numerous valves opening toward the neck. Most of the lymph of the body and chyle is discharged by the thoracic duct into the left subclavian veins. The contents pass upward, but cannot pass downward owing to the valves within, and at the outlet are valves that prevent the entrance of blood.

THOREAU (thō'rō), **Henry David,** naturalist and author, born in Concord, Mass., July 12, 1817; died May 6, 1862. He graduated from Harvard University, in 1837, and soon after entered upon a brief career as school teacher. Neither happy nor successful in that profession, he became a surveyor, and afterward tried to attain success by engaging in trade. He soon withdrew from the demands and restrictions of society to develop his talents in seclusion, and

for that purpose built a hut on the pine slope near the shores of Walden Pond, where he spent his time studying nature and his books. His early writings were contributed to a number of papers, and his first published work appeared in 1845, entitled "Walden, or Life in the Woods."

HENRY D. THOREAU.

Thoreau lived in his hut on Walden Pond for two years, spending his time in such frugality that his expenses were only $35 a year, or about ten cents a day. It was said of him that he never voted, paid no taxes, ate no flesh, never attended church, never married, never used tobacco or liquor, and was happiest when scrutinizing nature and literature. After leaving Walden Pond, in 1847, he engaged as pencil maker in Concord. His writings have been published in seven uniform volumes, including "A Week on the Concord and Merrimac Rivers," "Walden, or Life in the Woods," "Excursions in the Field and Forest," "Maine Woods," "Cape Cod," "Letters to Various Persons," and "A Yankee in Canada." The writings of Thoreau are remarkable for the exactness with which he details landscapes, objects, and persons. He contributed to *Putnam's Magazine,* the *Atlantic Monthly, The Dial,* and the *Tribune.*

THORIUM (thō′rĭ-ŭm), a rare metal discovered by Brezelius in 1828, so named from the Scandinavian god Thor. It is a grayish metallic powder, burns with a bright flame, and with oxygen forms a white dioxide called *thoria.* Thorium is found in Norway and North Carolina, where it occurs in thorite, orangite, and other rare metals. It is used for minor commercial purposes and in making the mantle for the Welsbach gas burner.

THORN, a city of Poland, 40 miles east of Bromberg, and 86 miles northeast of Posen. It is divided into two nearly equal parts by the Vistula River. Founded in 1812, it became important as a member of the Hanseatic League. In 1454 it was annexed to Poland, became a part of Prussia in 1793, and was transferred to Poland after the World War. Population, 1922, 31,801.

THORNDIKE, Edward Lee, psychologist, born at Williamsburg, Mass., Aug. 31, 1874. He studied at Wesleyan, Harvard, and Columbia universities, and in 1898 became an instructor in genetic psychology at Western Reserve University. In 1904 he was made professor of genetic psychology at Columbia University. He has published several books on psychology.

THORWALDSEN (tôr′wạld-sĕn), **Albert Bertel,** eminent sculptor, born in Copenhagen, Denmark, Nov. 19, 1770; died there March 24, 1844. He was a son of Gottschalk Thorwaldsen, a native of Iceland who had settled in Copenhagen, where he pursued the trade of a wood carver. After working with his father and studying at home, he secured admission to the Academy of Copenhagen in 1793, in which he gained a prize that enabled him to travel abroad and study art for three years. In 1797 he went to Rome, where he met Canova, who highly praised his model for a statue of Jason. A gentleman then traveling in Italy supplied the necessary money to execute a copy of it in marble, and from that time his success and fame were assured. He returned to Denmark in 1819, after having spent about 23 years in Italy. He was tendered a magnificent reception in Copenhagen, and an apartment in the palace of Charlottenburg was assigned to him. A year later he returned to Rome, where he labored continuously up to 1838, when he went back to Denmark with the view of remaining there permanently, but the climate made it necessary to leave for Italy in 1841. He revisited Copenhagen in 1844 and died shortly after reaching the city.

ALBERT BERTEL THORWALDSEN.

Thorwaldsen ranks as one of the greatest of modern sculptors, his productions being famed the world over, and is regarded by many the most skilled since Michael Angelo. His productions are very numerous and are concerned largely with classical and mythological subjects, though they include a number of historical and biblical characters. He bequeathed his possessions to his country, which are preserved in the Thorwaldsen Museum at Copenhagen, and gave a large portion of his fortune to his native city. Among his most celebrated productions are "Christ and the Twelve Apostles," "Procession to Golgotha," and "Saint John Preaching in the Wilderness," these three being in the cathedral of Copenhagen. Others include a bust of Byron, the bas-reliefs of Night and Morning, the figure of "Christ the Comforter," and a monument near Lucerne, Switzerland. Fine productions executed by Thorwaldsen may be seen in many places of Germany, Austria, Italy, and other European countries. About 300 of his works are in the Thorwaldsen Museum. Hans Peter Holst (1811-1893), a Danish poet and novelist, published 120 lithographs of the works of Thorwaldsen in his "Musee Thorwaldsen."

THOTHMES (thŏth′mēz), the name of four kings of Egypt, classed as the fourth, fifth, sixth, and eighth of the eighteenth dynasty. The first of these kings ascended the throne about

1560 B. C. and, according to Manetho, reigned for 22 years. Thothmes III. is the most famous of this line of kings. He became the ruler of Egypt about 1538 B. C. and held the throne nearly 54 years. Hatasu, his aunt, ruled conjointly with him about one-third of this period, but he became sole ruler about 1516 and entered upon a career of conquest. With a large army he invaded Syria, defeating the allied Syrian forces on the plain of Esdraleon, and subsequently conquered a large part of the region lying between the Euphrates and the Mediterranean. It appears he enlarged the Temple of Karnak, whose walls he inscribed with accounts of his deeds. He added to the splendor of Thebes and other cities along the Nile, from the delta to the second cataract, and erected numerous temples and obelisks. Among the famous obelisks constructed during his reign are those on Lateran Hill, in Rome; on the Thames Embankment, in London; and in Central Park, New York City.

THOUGHT, the power of the mind to form and rationally apply general conceptions. It involves the mental processes of comparing, judging, and reasoning. The function of apperception is primarily involved, but afterward it works upon the more abstract material used in arguments and reasonings. The lower exercises of mind are classed as *perception,* and in nature thought does not differ from the effort involved in that process, even in the higher processes of general conception. The latter do not include general concepts, such as represent classes of material objects, but inductions and all other mental products which are formed by generalization. See **Apperception; Conception; Reasoning.**

THOUSAND ISLANDS, the name applied to a group of islands in the Saint Lawrence River, near the outlet of Lake Ontario. The river has an expansion at this place from four to seven miles wide and forty miles long, within which are about 1,750 small islands. Many of them have beautiful scenery and are visited by tourists during the summer. Thousand Island Park is one of the chief attractions. Alexander Bay, located within the park, is popular as a summer resort. The islands have a varied line of scenery, including precipitous rocks and beautiful groves. Many wealthy Canadians and Americans have summer homes in these islands.

THRACE (thrās), an ancient country of Europe, whose main boundary on the north was formed by the Danube, east by the Black Sea, south by the Aegean Sea and Macedonia, and west by Macedonia and Illyria. It coincided more or less closely with the region now included in Bulgaria, Eastern Rumelia, and central European Turkey. The region is more or less mountainous and is divided into two parts by the Haemus Mountains (Balkans), the northern part forming Moesia and the southern part Thrace. Large forests of chestnut, fir, oak, and other classes of valuable woods were abundant. Marshy swamps extended along the coast and in many valleys. The Greeks occupied the region along the coasts, though their settlements extended to the interior highlands, where productive mines were worked with success. Much of the soil possessed remarkable fertility, yielding large quantities of wheat, millet, hemp, and fruits, while horses, cattle, sheep, swine, and poultry were reared in large numbers.

The Thracian horsemen rivaled those of Thessaly and played a prominent part in the military affairs of Greece. Philip of Macedon was attracted by the production of gold and silver and in 359 B. C. conquered most of Thrace. It became a Roman possession in 168 B. C., being annexed along with the territory of the Macedonian kingdom. After the decline of Rome it was overrun by Alaric and Attila, and in 1353 was taken as a Turkish possession by Amurath, but since then Bulgaria and Eastern Rumelia have been separated from it. The most noteworthy places of ancient Thrace include Sestos on the Hellespont; Abdera, the birthplace of Protagoras and Democritus; and Byzantium, the ancient name of Constantinople.

THRASHER (thrăsh'ĕr), the common name of a class of birds which resemble the thrush. In most species the bill is long and somewhat curved, the wings are short, and the general color is ash or brown above. The *brown thrasher,* sometimes called the brown thrush, is the best known of these birds. It has a pleasing song and may be heard both in the morning and in the evening. This bird is migratory, passing from the southern part of Canada to the vicinity of the Gulf of Mexico. Other species include the *gray curvebill thrasher,* the *Arizona thrasher,* and the *California thrasher.*

THREAD, a small twine or cord made by doubling and twisting several thicknesses of yarn. Thread made of cotton is used very extensively for sewing clothing and other manufactures. It is made from the fibers of the best grade of cotton, usually the sea island cotton, and the process of manufacture is largely by machinery. The cotton fibers are first picked and passed through the carding machine, after which they are fed into the drawing frame. A series of rollers in the drawing frame causes the carded cotton to be drawn out into ribbonlike forms, this being effected by each succeeding set of rollers moving faster than the preceding. It is then taken to the doubling frame and compressed to form a delicate strip, and these strips are again carded, after which they are wound upon a bobbin. The finished product is obtained by twisting six of the strips into a cord or thread, but to obtain the proper size it is necessary to reduce them by spinning them several times successfully. Thread sold on the market is either white or colored. White thread is obtained by bleaching after the spinning has been completed, while the colored varieties are obtained by dye-

ing, after which the product is wound upon wooden spools. Several kinds of thread are made of linen and silk.

THREADWORM, the name of several worms classed with the entozoa, so called from the slender threadlike body. Several species have been described. They are parasites in human beings and are especially annoying in children. The common threadworm is four to six inches long, is one-tenth of an inch in diameter, and has a hard and muscular body. Some worms of this kind attain a length of three feet, while others are quite small. Species closely allied with those found in man occur in the brain cavity of birds.

THREE RIVERS, a town of Saint Joseph County, Michigan, 25 miles south of Kalamazoo. It is surrounded by a fertile farming and fruit-growing region, giving it a growing trade in produce and merchandise. It has extensive railroad facilities and is provided with good schools, numerous churches, and modern municipal improvements. Among the manufactures are flour, lumber products, paper, chemicals, and farming implements. Population, 1920, 5,200.

THREE RIVERS, a city of Quebec, capital of Saint Maurice County, 75 miles southwest of Quebec. It is at the confluence of the Saint Maurice and the Saint Lawrence rivers, on the Canadian Pacific and the Canadian National railways, and is important as a port of entry. Near it are the famous falls of Shawanegan. The principal buildings include the county courthouse, the Protestant College, the Ursuline Convent, the high school, the Dominion Hotel, the public library, and a bishop's palace. It has manufactures of lumber products, boots and shoes, machinery, and clothing. The public utilities include sewerage, electric lighting, and waterworks. It was founded by Champlain in 1634, hence is one of the oldest towns in Canada. Population, 1921, 22,367.

THRESHING MACHINE, an important machine of modern construction, used to separate the grain from the chaff and straw. In primitive threshing the grain was beaten out of the straw by blows with the flail, which was swung by the workman. It consists of two pieces of wood fastened together by stout thongs, one of which is held in the hands of the workman, while the other swings loosely and is caused to strike the heads of the grain spread upon the ground or the barn floor. Anciently the Egyptians and Israelities threshed the grain by spreading the loosened sheaves upon a circular piece of ground and having it tread upon by oxen. The oxen were driven in the circle formed by the sheaves of grain, and in some cases were hitched to the threshing sledge, which was rolled over the sheaves. This process was continued until the grain was well shelled out of the ears, when the straw was carefully removed by hand and the remaining grain and chaff were gathered and fanned, thereby separating the grain from the impurities. While the sledge has gone out of use, the flail is still employed to some extent, even in America and Europe, especially to thresh beans and peas.

The modern threshing machine may be said to date from 1786, when Andrew Meikle, a mechanic of Scotland, constructed a thresher that contained the principal parts of a modern machine. It utilized the rotary beater, or flail type, as seen in the *beater,* or *drum,* of the modern types. This beater contains iron teeth held in place by burs, and similar teeth are in the *concave.* The teeth of both parts are so fitted that those of the beater pass closely by those of the concave as the beater revolves rapidly. Sheaves of grain are loosened and fed with the ears toward the machine, and the straws are taken up as the beater revolves, though sheaves must be fed regularly so as not to permit the machine to run empty. Immediately back of the beater is a *revolving drum,* or *apron,* which carries the grain and straw. Rakes and beaters strike downward upon the straw to separate from it the loosened grain, and the latter is secured by a *shaker* and carried to the blowing drum and then to the *winnowing apparatus,* where the chaff is blown out by a *fanning mill* as it passes upon screens, through which the grains fall. In the modern machines there are screens of different sizes fitted for various kinds of grain, such as wheat, oats, barley, rye, timothy, spelt, etc., and a second set of screens causes small seeds of weeds to be separated from the grain. The straw is carried by a stacker, or is blown from the machine by a set of fans that revolve rapidly. In most modern machines the apron is entirely dispensed with and the agitator, or vibrator, models are used instead.

It requires ten horses to furnish sufficient power for a threshing machine. The power is transmitted by a belt or a tumbling rod from the machine known as the *horse power* to the separator. Horses have been displaced largely by gas or steam engines with a capacity of twelve to fifteen horse power. A modern machine will thresh from 800 to 1,500 bushels of grain per day. Machines of special construction are used for threshing peanuts, peas, rice, beans, and clover. Coal is used chiefly as fuel, and the smokestack is screened as a protection against fire. In sections of country where fuel is scarce or expensive, the straw-burning furnace is used to some extent.

THRESHER SHARK, or **Fox Shark,** a species of shark found in the warm seas. The tail is peculiarly long and is used in aiding to obtain food. This shark usually rushes into a school of gregarious fishes and kills or stuns many by threshing about with the tail. The larger specimens are about fifteen feet long and are whitish beneath and gray-bluish above. These fish are found in the Mediterranean and the Atlantic. They are not valuable as a commercial fish.

THRIPS (thrĭps), the name of a genus of minute insects. The body is slender and has four wings, but they appear to leap rather than fly. About thirty American species have been described and they bear a close resemblance to the plant lice. These insects attack the flowers and leaves of plants, but some species feed upon other insects. Some are injurious to tobacco, while others damage onions and timothy grass.

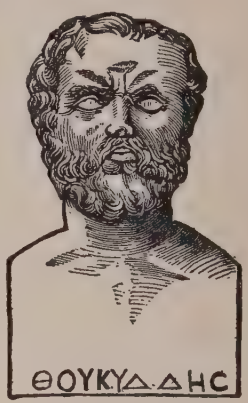
THRUSH, a genus of birds common to all the continents and most of the islands. They embrace a great variety of species. Some are

BROWN THRUSH.

gregarious, others live solitarily or in pairs, and some are migratory. The *wood thrush* is one of the most widely distributed species of North America, ranging from Guatemala to Southwestern Canada. It migrates southward in the fall, usually to the Carolinas and beyond. The length is eight inches, with an alar extent of about fourteen inches. It is quite shy, usually preferring its native woods, and the song is clear and beautiful. The *brown thrush,* or *thrasher,* is another widely distributed bird and its song is the most beautiful of the American thrushes. It is reddish-brown above and yellowish-white below, and somewhat resembles the mocking bird. The *hermit thrush* is an American bird of solitary habits. The best known of the European species is the *song thrush,* a bird of beautiful song. Its plumage is brown and yellowish, with numerous spots of dark brown. It inhabits all parts of Europe, but moves southward on the approach of winter. Both male and female are attentive to their young, usually four to six in number. The body of a full-grown song thrush of this kind is nine inches long. Its song is very beautiful and it may be taught simple airs in captivity. Other species include the *West Indian thrush.* The common robin belongs to the thrush family.

THRUSH, or Sprue, a disease common to infants, but sometimes seen in adults. It attacks the lining membrane of the mouth and throat, the angles of the lips, and the surface of the tongue. In most cases the affected parts are characterized by whitish specks. These small specks or patches develop into ulcers, causing a painful rawness of the affected parts. In some cases the affection is rather a symptom than a disease, and requires the attention of a physician. Cleanliness is especially important.

THUCYDIDES (thû-sĭd'ĭ-dēz), eminent historian, born in Athens, Greece, about 471; died about 400 B. C. He was a son of Olorus, and studied oratory under Antiphon and philosophy under Anaxagoras. His family owning gold mines in Thrace and being wealthy, he was privileged to secure a liberal education, and rose rapidly as a prominent influence in society and in public affairs. The history read by Herodotus at Olympia had such an impressive influence upon him that he modeled largely after that writer, but greatly excelled him in style. In 424 B. C. he was given command of an Athenian squadron at Thasus, but, being charged with carelessness in performing his duty in the Peloponnesian War, he was exiled for twenty years. It is thought that the period of his exile was spent in several towns of the Peloponnesus, but this is not certain. His writings include eight books of history, but the last of the series does not contain political speeches, a striking feature of the first seven books, hence has been assigned to other writers. These historical writings treat of the Peloponnesian War, which covered the period of 29 years between 431 and 402 B. C., but they extend only to the year 411 B. C. It is not certain whether Thucydides died at that time or whether the latter part of the history, if completed, was destroyed. As a writer he was painstaking, closely analyzed character and action, and treated the subject-matter with remarkable accuracy. Meaning is condensed in his writings, and the style is not only beautiful but interesting. Many translations into modern languages have been made from his works by various writers.



THUCYDIDES.

THUGS (thŭgz), a class of religious thinkers formerly numerous in India, so called from a Sanskrit word meaning *a cheat.* The members of this sect formed a secret society made up of gangs numbering from 10 to 200. They were banded together and traveled under various disguises with the view of attaining the confidence of the wealthier travelers and traders, and at a favorable opportunity strangled and robbed them. The practice is known as *thuggee* and was first mentioned by travelers in India in 1356. Each band was accompanied by officers specially assigned to them, such as leaders, teachers, spies, stranglers, gravediggers, and guards. They infested the mountain regions and river valleys, and usually came out to the towns and populated districts to secure the confidence of those de-

signed to be murdered and robbed. This system of lawlessness was practiced from religious motives, being considered acceptable to their goddess, Kali. Rigid measures were taken against the Thugs by Lord William Bentinck in 1829. In the period between 1830 and 1835 fully 2,000 arrests were made, and of these 1,500 were convicted and sentenced to death or imprisoned. The law of 1830 made membership in a gang of Thugs punishable by imprisonment for life at hard labor. This rigid course practically exterminated the once powerful order, though some gangs still linger in remote regions.

THULE (thū'lē), the name given by the ancient Greeks to the most northerly portion of Europe known to them. It is thought to have referred to a part of Norway or the Shetland Island. Later the Romans applied the same name to the northernmost parts of the earth, and in this sense it was used in oratory. *Ultima Thule* had reference to the most distant unknown land, and the term was used in this sense by the Romans.

THUMANN (tōō'măn), **Paul,** painter and illustrator, born in Tschacksdorf, Germany, in 1834; died in 1908. He studied in his native town and subsequently attended the universities of Berlin, Weimar, and Dresden, giving much attention to painting. He was teacher of drawing and painting in an academy at Weimar several years, and subsequently held like positions at Dresden and Berlin. In 1873 he completed a series of paintings that illustrate five scenes from the life of Luther. His "Baptism of Wittekind" and "Return of Arminius from the Teutoburg Forest" are noted mural paintings. He illustrated Heine's "Book of Songs," Goethe's "Poetry and Truth," Hammerling's "Amor and Psyche," and Chamisso's "Women's Love and Life."

THUN (tōōn), a lake of Switzerland, in the canton of Bern. It is located about 1,835 feet above sea level and is two miles wide and ten miles long. On the eastern shore is the town of Interlaken and on the northwestern coast is Thun. These places are connected by a railway. The Aar discharges the overflow. Large numbers of tourists visit the vicinity at all times of the year.

THURLOW (thûr'lō), **Edward,** public man, born in Norfolk, England, in 1731; died Sept. 14, 1806. He studied at Cambridge University, but did not graduate, and was admitted to the bar in 1754. Shortly afterward he entered politics as a Tory, and in 1768 was elected to Parliament. He became Lord Chancellor in 1778 and took his seat in the House of Lords as Baron Thurlow of Ashfield. As a public man he opposed constitutional reforms and favored the slave trade. Through the efforts of Pitt he was dismissed from the office of Lord Chancellor, but was restored for a brief time and was again dismissed in 1783, when he was succeeded in that office by Pitt. Though he has a great reputation for ability, he is looked upon as a man of overbearing and passionate character.

THURMAN (thûr'mạn), **Allen Granberry,** jurist and statesman, born in Lynchburg, Va., Nov. 13, 1813; died at Columbus, Ohio, Dec. 12, 1895. He descended from the family of Joseph Hewes, a signer of the Declaration of Independence. His parents settled at Chillicothe, Ohio, in 1819, where he attended the public schools and the academy. After surveying for some time, he studied law and in 1835 was admitted to the bar. He became a member of Congress in 1844, served as justice of the State supreme court from 1851 to 1854, and was chief justice from 1854 to 1856. In 1867 he was the unsuccessful Democratic candidate for Governor of Ohio, being defeated by Rutherford B. Hayes by fewer than 3,000 votes, but was elected to the United States Senate in 1869, serving in that body until 1881. He was the leader of his party in the Senate, served on a number of important committees, and for some time was its president *pro tem.* The Thurman Act, which compelled the Pacific railroads to execute their contracts with the government, was one of the important laws formulated by him. President Garfield appointed him a delegate to the Paris monetary convention in 1881. He was mentioned as a candidate for President at various times and in 1888 became the nominee for Vice President with Cleveland, but sustained defeat at the polls.

THURSDAY. See **Thor.**

THURSTON (thûrs'tŭn), **Robert Henry,** mechanical engineer, born in Providence, R. I., Oct. 29, 1839; died in 1903. He graduated from Brown University in 1859, and subsequently studied mechanical engineering in the workshop of his father. Soon after the beginning of the Civil War he joined the Union army and served with distinction at Port Royal and Charleston. In 1865 he accepted a professorship in philosophy at the Annapolis Naval Academy, became professor of engineering in Stephens Institute of Technicology in 1876, and held a like position in the Sibley College at Cornell, beginning work there in 1885. Thurston has been fittingly honored by many American and foreign engineering and scientific societies, and was the first president of the American Society of Mechanical Engineers. He served on commissions of the United States government to aid in testing iron and steel, to investigate the cause of boiler explosions, and to report on the construction of safe and bank vaults. His published works are numerous, including "Materials of Engineering," "History and Growth of the Steam Engine," "Manual of the Steam Engine," "Manual of Steam Boilers," "Friction and Lost Work," "Friction and Lubrication," and "Text-Book of the Materials of Construction."

THWAITES, Reuben Gold, historian, born in Dorchester, Mass., May 15, 1853. He received a public school education, did postgraduate work at Yale, and in 1876 became editor of the *Wis-*

consin State Journal at Madison. In 1886 he became secretary of the Wisconsin State Historical Society. His writings are numerous and give evidence of careful and scholarly research. They include "Down Historic Waterways," "Stories of the Badger State," "The Jesuit Relation," "France in America," and "The Colonies, 1492-1750." He died Jan. 17, 1916.

THYME (tīm), an aromatic plant of the mint family. The genus comprises about thirty species, mostly native to the southern part of Europe. The common thyme has an upright stem, about a foot high, and a strong odor. It is cultivated in gardens as an ornamental plant and yields an essential oil used for flavoring. Several species have been naturalized in North America.

TIAN SHAN. See **Thian Shan.**

TIARA (tī-ā'rȧ), the name of a headdress first used by the reigning family of Persia, but later adopted by the priests and potentates of other countries. Nicholas I., Pope of Rome, adopted the tiara as symbolical of the Pope's temporal authority in 860. The tiara worn by the popes consists of a cap of cloth made of gold. It is encircled by three golden coronets and surmounted by a cross of gold. A fringed and embroidered pendant hangs from either side. This tiara is the crown of the Pope, but in purely spiritual ceremonies that official wears the miter, like other bishops.

TIBER (tī'bẽr), in Italian, *Tevere,* a famous river in Italy, which rises on the southern slope of the Apennines, in Tuscany, and, after a course of 245 miles toward the south, flows into the Mediterranean. The channel forms a zigzag line, especially in the upper part, and there are rapids between Todi and Passo del Forello. It receives the water from the Nera at Orte, to which place it is navigable for boats of light draught, a distance of about 96 miles from the Mediterranean. Three miles above Rome it is joined by the ancient Anio, now the Teverone, and within the city it divides to form the ancient island of Tiberina. Rome is situated fifteen miles from its mouth and is reached by large vessels. Although it enters the sea by a large delta, the main channel is 300 feet wide and 10 to 20 feet deep at the place where it discharges. A number of substantial improvements have been made in the way of embankments, excavations, and canals to facilitate navigation. The valley of the Tiber is a fertile region and is traversed by several railroad lines. Its water is colored yellow by the clay forming the basin through which it flows, hence it is often spoken of as the yellow Tiber.

TIBERIUS (tī-bē'rĭ-ŭs), **Claudius Nero Caesar,** Emperor of Rome, born Nov. 16, 42 B. C.; died March 16, 37 A. D. He was a son of Tiberius Claudius Nero, hence the stepson of Augustus, by whom he was adopted. His education received careful attention, and the retired mode of his life brought him into favor with the emperor and the Roman people. He first married Vipsania Agrippina, but was forced by the emperor to divorce her in 11 B. C. and marry his daughter Julia. Soon after a command was given him in the army stationed on the German frontier, and on the death of Augustus, in 14 A. D., he ascended the Roman throne. Insurrections broke out soon after in the regions of the Rhine and in Pannonia, but these were soon crushed by Drusus and Germanicus. Tiberius ruled with considerable moderation and liberality in the beginning, but soon developed into a suspicious tyrant. He appears to have been influenced largely by his mother, Livia, and after her death, in 29 A. D., by several others, particularly by Aelius Sejanus, an able commander of the Pretorian guards.

Many of the leading citizens, including his popular nephew, Germanicus, were put to death, largely for fear they might become claimants of the throne. The government was left entirely to Sejanus in 26 A. D., while he retired to the island of Capri to indulge in sensual pleasures. In his absence Sejanus became ambitious to usurp the throne, but Tiberius had him put to death in 31 and chose Marco to manage the government. The last seven years of his life were remarkable for degradation, his vices causing ulcerous sores to appear on his body, and he never again returned to Rome. Caligula succeeded him as emperor, being proclaimed by the people before the death of Tiberius, who was suffocated while in a fainting fit. Christ was crucified at Jerusalem in the reign of Tiberius. He is the author of several Greek poems, an oration on L. Caesar, and a commentary on his political life.

TIBET (tĭ-bĕt'), or **Thibet,** a country of Central Asia, nominally a province of the Chinese Empire, though largely independent in its government and internal relations. It is situated north of the Himalayas, forming the large region between those mountains and the Kuen-Lun on the north, and extending from Cashmere and the Karakorum range to western China. The region has not been explored extensively, but is supposed to have an area of 651,500 square miles and a population of 6,125,000. It consists of a high plateau, which in few places is lower than 10,000 feet, and contains the sources of several of the great rivers of China and India, among them the Brahmaputra, Hoang-ho, Indus, and Yang-tse-Kiang. The surface is generally elevated to heights varying from 12,000 to 15,000 feet, though in some places peaks tower 20,000 feet above the sea, and numerous salt and fresh water lakes prevail at elevations approximating 14,500 feet. Though situated in latitude almost due east of central Italy, the climate is rigid, owing to its vast elevations. The summers are extremely dry and hot, while the winters approximate those of the Frigid zones. The air is deprived of its moisture before reaching the Tibetian plains, thus making the climate arid, especially from October to March, when nearly all forms of vegetation become dry. Some re-

gions are sandy deserts and others contain a rich soil and considerable forests, but the greater part of the country is best adapted to grazing.

The early history of Tibet is wrapped in tradition, and little was known of its people prior to the 5th century of the Christian era, when they became converted to the teachings of Buddhism. China made it tributary in 821. The first authentic accounts of the country were published by Marco Polo in the 13th century. The inhabitants, though mild in character, have maintained a stubborn opposition to foreign travelers and European trade. Several explorations were made inland in the latter part of the 19th century, and from that period dates the information obtainable regarding the people and their industries. Agriculture is the chief occupation in the valleys, but in many sections irrigation is necessary, while the great scope of country lying in the hilly and less fertile regions is utilized for grazing. It has deposits of gold, silver, tin, copper, niter, sulphur, borax, and salt, but development in mining has been slow on account of a scarcity of transportation facilities and a limited supply of fuel. The soil products include cereals and fruits, while the domestic animals embrace mainly cattle, sheep, camels, and horses. The natives engage in the manufacture of carpets, toys, jewelry, fabrics, and utensils. Most of the trade is with China and consists of exchanging native products for tea, idols, incense, chemicals, metals, tobacco, cotton and woolen clothing, and rice. Lhassa is the seat of the civil government and of a number of monasteries and Buddhist institutions. The Tibetans speak a language which is related to the Chinese tongue. They have a copious literature, both religious and secular. Lamas or priests, who represent a form of Buddhism, rule the country. Yatung, a town beyond the Sikkim frontier, was opened to foreign trade under a treaty agreed upon in 1894 and is now the residence of several European representatives. Two Chinese represent the government of China at Lhassa.

Great Britain has looked with suspicion upon the movements of Russia in the valley of the headwaters of the Yang-tse-Kiang River, claiming that its safety and progress in the northern section of India demand the freedom of the upper valley from Russian control. On the other hand, the Russians assert that the British are seeking to establish a protectorate over Tibet. In 1904 a British expedition of 1,000 men, under General McDonald and Colonel Younghusband, invaded the country to hold a conference with the view of agreeing upon certain treaty misunderstandings and to prevent further border depredations. When the expedition reached Guru, about half way from the British India border to Lhassa, it was met by a body of Tibetans with the view of preventing an attack upon Lhassa. In the first encounter the Sikh troops were routed with a loss of 300 men, but later reënforcements were sent and the march to Lhassa was continued. Those who accompanied the expedition described the capital city as an interesting relic of a former civilization. British troops were stationed at the capital until 1908, when they were withdrawn, on the payment of an indemnity.

TIC DOULOUREUX (tĭk dōō-lōō-rōō′). See **Neuralgia.**

TICK, a class of parasites that infest the skin of certain vertebrate animals and various plants. They abound in many parts of the world, but chiefly in warm countries. The mouth is in the form of a sucker, which they bury in the skin of animals and suck the blood. Most species are found on different plants, clinging to the outer bark or coating, but watching a favorable opportunity to fasten themselves to animals. They suck the blood with great greed after becoming attached, thereby causing considerable pain and inflammation, and are frequently fastened with such a firm grip that it requires quite an effort to loosen them. In some warm countries, especially in South America, ticks are very numerous and, unless detached, attain the size of a large bean. The *dog tick* is a familiar species in the United States, frequently attaching itself to dogs, cattle, and even to man. The *carapata* is native to Brazil, and the *tampan* is found in South Africa. Some species are aquatic and frequently fasten themselves to tortoises and other reptiles.

TICKNOR (tĭk′nĕr), **George,** historian, born in Boston, Mass., Aug. 1, 1791; died there Jan. 26, 1871. He completed a course of study at Dartmouth College by graduation, in 1807, and, after studying law in the office of a Massachusetts lawyer, was admitted to the bar in 1813. After practicing a year, he abandoned law to engage in literature, and in 1815 entered the University of Göttingen, Germany, for two years' study. Subsequently he made an extended tour through Spain, Portugal, and France with the view of studying life and literature. On returning to America, in 1819, he was made professor of French and Spanish literature in Harvard University. He resigned that position in 1835 to spend three years in Europe, and in 1838 settled at Boston to engage in writing his essays and history. His "History of Spanish Literature" appeared in 1849 and was shortly after translated into German, Spanish, and French. Other works of value from his pen include "Life of Prescott" and essays on Thatcher's "Sermons," Milton's "Paradise Lost," Griscom's "Tour in Europe," and "Mode of Teaching Living Languages." He wrote "Essays on Daniel Webster," "Essays on General Lafayette," and "Remarks on Changes Proposed in Harvard University."

TICONDEROGA (tī-kŏn-dĕr-ō′gȧ), a village of New York, in Essex County, 98 miles north of Albany, on the Delaware and Hudson and other railroads. It occupies a fine site a short distance north of Lake George, has an

abundance of water power, and is the center of a large trade in graphite, lumber, and merchandise. The French built Fort Carillon, later called Fort Ticonderoga, in 1755, as a means to command lakes George and Champlain. In 1758 a British force under General Abercrombie made an attack upon it, but was repulsed with a loss of 2,000 men. The British numbered 15,000 and the French under Montcalm only 3,600. General Amherst appeared before Ticonderoga in 1759, but the French abandoned it with little opposition. On May 10, 1775, Ethan Allen arrived on the shore of Lake Champlain with a small force and surprised and captured the fort without striking a blow. Burgoyne led a British army against Ticonderoga on July 1, 1777, and, after planting a battery on Fort Defiance, compelled the garrison, 3,000 in number, to evacuate. The fort fell into ruins shortly after the war, but traces of its walls still remain. Population, 1905, 2,014; in 1920, 2,102.

TIDES, the periodic rising and falling of the oceans and the waters connected with them, caused by the attraction of the moon and sun. No satisfactory explanation of these movements of oceanic waters was made until Sir Isaac Newton traced their origin to the law of gravitation, which he discovered in 1666. The tides assume the form of a general wave of water, scarcely perceptible on the open sea, but rising to considerable heights in the estuaries of rivers and inlets having precipitous banks. They are observed twice in the course of a lunar day, or in 24 hours 49 minutes of mean solar time, and occur 52 minutes later from day to day than on the day preceding. The rising of the water is called *flood tide,* and the falling, *ebb tide.* Flood tides and ebb tides follow each other every six hours. The waters remain stationary for a few minutes, when they reach their highest and lowest points, these points being called, respectively, *high water* and *low water.* Gravitation has an equally strong influence upon the land and water, but, since the latter is free to move, it tends to rise under the attraction of the moon and sun as these bodies pass their influence over the surface of the earth as it rotates upon its axis. The water thus drawn by attraction is accumulated in the part of the earth nearest to the moon. That body has an attraction for the bulk of the earth, and, while causing a flood tide on the side of the earth turned toward it, it also causes a flood tide on the opposite side of the earth by pulling it away from the water, although the latter is somewhat less perceptible.

The influence of the moon is not instantaneous, but requires a little time to produce full effect, hence flood tides occur a few hours after the moon is on the meridian of any particular place. While flood tides occur on the two sides, those turned to and from the moon, ebb tides occur in the regions situated halfway between them, owing to the waters being necessarily depressed. The sun being 400 times farther from the earth than the moon, it has a less marked effect, but it tends to increase or diminish the lunar tides, according to the position of that body in the heavens. When the sun and moon act simultaneously on the same hemisphere of the earth, the tidal wave is higher than usual and is called a *spring tide.* However, when the sun and moon are 90° apart, each produces a tide on the portion of the earth directly influenced by it, and the lunar tide at that period is called *neap tide.* Spring tides occur only at new and full moon, and neap tides take place at first and last quarters, the sun being then at quadrature with the moon. When the moon is in perigee, its attraction is stronger, hence the flood tide is higher and the ebb tide is lower than at other times.

The height of tides is very different, owing to the difference in the depth and size of the water and to the modifications of the contour and outline of the coast. On midocean it is hardly noticeable and rises from a few inches to three feet, but, where the moving water comes in contact with a precipitous shore, it frequently piles up many feet in height. This is true especially off the coasts of continents having shelving bays, deep gulfs, or broad river mouths. The difference between ebb and flood neap tide at New York is about three feet, and that of spring tide about five feet, while at Boston the difference is about ten feet. A headland extending into the ocean diminishes the tide, as off Cape Florida, where the average height is only fourteen to twenty inches. Spring tides in the Persian Gulf and China seas sometimes rise 30 to 38 feet; at the mouth of the Severn, 40 to 48 feet; and in the Bay of Fundy, 65 to 90 feet. A strong wind blowing in the direction of the tide tends to greatly increase the depth of the inflowing water. Where the coasts are low, as is the case in many places, the tide waters flow inland several miles. Tides are utilized in commerce, since they enable ships to sail up the mouths of rivers and land in many harbors otherwise too shallow for approach.

TIECK (tēk), **Ludwig,** novelist and poet, born in Berlin, Germany, May 31, 1773; died April 28, 1853. He studied at the universities of Göttingen, Halle, and Erlangen, and in 1794 settled in Berlin to devote himself to literature. His first writings were published in the *Ostrich Feather Magazine,* but he soon after traveled to enrich his mind, and in the meantime published a number of novels and poems. In 1800 he visited Jena, where he formed the friendship of Brentano, Schlegel, and Novalis. In connection with these eminent men of literature, he organized the so-called Romantic School of Germany. He made an extended tour of Italy in 1805, and in 1817 visited England to gather material for his "Shakespeare." From 1819 to 1840 he resided at Dresden, but in the latter year was invited to Berlin by Friedrich William IV. of Prussia. His writings are very numerous. They

are characterized by a deep poetic spirit and fine style, and reflect the power of a vivid imagination. Among the most prominent of his works are "Bluebeard," "Two Remarkable Days in Siegmann's Life," "Life and Death of Little Red Ridinghood," "Heart Effusions of an Art-Loving Monk," "Fancies on Art," "Romantic Poems," "Phantasus," "A History Without Adventures," and "Tales." He made an excellent translation of "Don Quixote." His brother, Christian Friedrich Tieck (1776-1851), is noted as a sculptor. He coöperated with Rauch in improving the art of sculpturing.

TIEN-TSIN (tē-ĕn′-tsĕn), or **Tientsin**, a city of China, at the junction of the Huer and Peiho rivers, 70 miles southeast of Peking. The city is reached by small vessels and is the chief railroad center of China. It has undergone remarkable improvement, especially in its buildings and municipal facilities, within the last few years. Formerly it contained only illy constructed houses of mud and dried brick, but its streets have been macadamized, trees have been planted, and water and drainage systems have been introduced. The streets are lighted by gas and electricity and telephone and telegraph connections are maintained with other centers of trade. These improvements have been carried forward by foreign enterprise, but the native Chinese have entered into the spirit of progress and have given sanction to the newer and better conditions.

Among the principal buildings are an imperial military college, a mint, an imperial university, an arsenal, and a number of schools, churches, temples, and missionary stations. The Chinese Mining Company has its headquarters in the city, its mines being at Tong Shan, about 180 miles to the north. Much of the machinery for the mines was brought from England and Germany. The city has a large export trade in coal, cotton, peas, dates, and wool. Opium, clothing, sugar, and machinery are imported. At present the annual foreign trade is estimated at $45,500,000. The allied armies of France and England captured the Taku forts in 1860 and shortly after took possession of Peking. In 1900 the allied armies of Germany, France, Russia, the United States, and England captured the city, the disturbances being caused by the wholesale destruction of missionary interests by the Boxers. Shortly after the allied armies entered Peking. Population, 1922, 1,050,000.

TIERRA DEL FUEGO (tē-ĕr′rȧ dĕl fwȧ′gō), meaning land of fire, an island group near the southern extremity of South America, which is separated from the mainland by the Strait of Magellan. The archipelago consists of one large island and numerous small islets, the total area being 32,000 square miles. Tierra del Fuego, the chief island, is 300 miles long and tapers toward the southeast into Cape San Diego. The point farthest south is formed by a small island and is known as Cape Horn. These islands are of volcanic origin. They have a mountainous surface, their peaks ranging from 4,500 to 5,450 feet above sea level. The line of perpetual snow extends some distance below the summits of the more elevated peaks and vegetation consists principally of stunted forest trees, shrubs, and grasses. These islands have a very cold and disagreeable climate. The inhabitants are Patagonians, who subsist by fishing and hunting. Magellan discovered these islands in 1520 and named them from the numerous fires along the coast kept at night by the fishermen. Population, 1922, 2,162.

TIFFIN (tĭf′fĭn), a city in Ohio, county seat of Seneca County, on the Sandusky River, 35 miles southwest of Sandusky. It is on the Baltimore and Ohio, the Pennsylvania, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. Among the noteworthy buildings are the county courthouse, the high school, the public library, the Heidelberg University, and the Ursuline College. Other features include the Riverview Park and the soldiers' monument. It has manufactures of pottery, cigars, bread, gloves, earthenware, machinery, glass, and farming implements. Tiffin was settled in 1819 and incorporated in 1850. Population, 1920, 14,375.

TIFLIS (tyĕ-flyĕs′), a commercial city of Russia, capital of Caucasia, on the Kur River. It has good railroad facilities and a large trade in raw and manufactured silk, cotton goods, carpets, dried fruits, and merchandise. Among the manufactures are cotton and silk goods, soap, leather, carpets, linens, machinery, and utensils. Electric lighting, rapid transit, telephones, waterworks, sewerage, and street pavements have been constructed under Russian engineers. The principal buildings include those occupied by the government, such as the grand ducal palace, the post office, and the townhall. It has a number of schools and institutions of secondary learning and several hospitals and scientific institutes. The architecture is a mixture of European and Asiatic plans of construction. A large number of the inhabitants are of Armenian, Georgian, or Persian descent. Tiflis was founded in the 5th century. It was destroyed in 1795 by Aga Mohammed Khan, Shah of Persia, and in 1801 became a part of Russia. Population, 1906, 161,520; in 1921, 198,140.

TIGER, a powerful carnivorous mammal of the cat family, about eight feet long and three to four feet high. An adult tiger weighs about 500 pounds. The front feet have five toes and the hind feet four, and all are characterized by strong retractile claws. The color is tawny yellow above and white beneath, with vertical black stripes on the body and black rings on the tail. It is able to swim with ease and frequently crosses rivers and inlets. The tiger is found in the region of Asia lying east of the Caucasus and south of central Siberia, but is most numerous in the swamps and grassy plains along the shores of great rivers, especially in India, Suma-

tra, and Java. Its voice is a loud grunting sound, being hardly comparable to the loud roar of the lion. It is very active and graceful and exercises fierce cunning in the capture of its prey.

Tigers lie in wait near the brook or other places frequented by animals, and spring forward with remarkable certainty to grasp and tear the prey to pieces. They are more feared by the natives than the lion, being more active and cunning. *Bengal tigers* are the best representatives of the species, and *man-eating tigers* are the old and nearly toothless specimens, finding man a favorite prey. The female is somewhat smaller than the male, and differs from it in not having a long growth of hair on the cheeks. Tigers are caught alive in various ways, but mostly by exposing a looking-glass within a room, near the door. A tiger on the outside, seeing its image in the glass, is enticed into the room by thinking it another tiger, and is caught by a trapdoor dropping. The Romans caught tigers in large numbers and brought them to the gladiatorial fights in Rome.

BENGAL TIGER.

TIGER CAT, the name commonly applied to any wild cat of large size, especially if it has some resemblance in form and markings to the tiger. The name is frequently given to the chati of South America, as well as to the serval and the ocelot. See **Cat.**

TIGLATH-PILESER (tĭg'lath-pĭ-lē'zẽr), the name applied in the Scriptures to several kings of Assyria. The first of these kings began to rule about 1120 B. C. Under this ruler the dominion of Assyria was enlarged by adding to it the region now embraced in Armenia, Kurdistan, Persia, Cappadocia, and a part of Syria. However, Tiglath-Pileser III., who reigned from 745 until 727 B. C., was the most powerful of this dynasty. During his sway Babylonia was made a part of his realm and he sent expeditions against the Medians and Syrians. He is referred to in the Old Testament as Pul and it is related that he aided Ahaz, King of Judah (II. Kings xvi, 7). After his campaign in Palestine he proceeded to Babylonia to quell difficulties, and in 728 B. C. he was crowned as king of the Babylonians. He was succeeded by his son, Shalmaneser IV. See **Assyria.**

TIGRIS (tī'grĭs), the second river of Western Asia, which rises on the southern slope of the Anti-Taurus Mountains, near the upper course of the Euphrates. It receives the Bitlis River at Tilby and joins the Euphrates at Korna, about 100 miles from the Persian Gulf, the united streams being known as the Shat-el-Arab. The general course of 1,175 miles is toward the southeast and almost parallel to the Euphrates, Mesopotamia lying between the two rivers. It is navigable for light freight-bearing steamers to Bagdad and for smaller vessels to Mosul. The upper course forms a rapid stream, bringing down large quantities of silt. It was the great channel for commercial navigation in ancient Assyria and on its banks were the cities of Nineveh, Ctesiphon, and Seleucia. The most important cities on the Tigris at present are Bagdad, Mosul, and Diarbekr.

TILDEN (tĭl'dẹn), **Samuel Jones,** statesman, born in New Lebanon, N. Y., Feb. 9, 1814; died Aug. 4, 1886. He studied at Yale University and the University of New York, but did not complete his course on account of ill health. Subsequently he was admitted to the New York bar, where he became famous as a corporation

counsel and amassed a large fortune. He was elected to the New York Legislature in 1845. During his term of office he became a leader in canal construction and other extensive improvements, and the following year was a member of the State constitutional convention. As a leader of the New York Democrats, he opposed the Tweed ring in 1871, and in 1874 was elected Governor of the State by 50,000 majority, serving in that office until 1877. At that time the beautiful State Capitol building at Albany was begun, which is considered one of the finest structures in America.

SAMUEL J. TILDEN.

The Democrats nominated Tilden for President in 1876 against Governor Hayes of Ohio. At the election the country outside of South Carolina, Florida, and Louisiana gave the two candidates about the same number of electors, and the Democrats laid claim to a majority in these states. However, the Republicans claimed the election of Hayes, who was afterward seated by an electoral commission of fifteen named by Congress. The commission was constituted of eight Republicans and seven Democrats and by a strict party vote gave the decision in favor of the Republican candidate, admitting 184 votes for Tilden and 185 for Hayes. Of the popular votes as counted, Tilden received 4,284,265 and Hayes 4,033,295. Tilden became known as the Sage of Gramercy Park, continuing an influential adviser and prominent counsel, but declined the nomination for President in 1880 and 1884. He made a gift of $4,000,000 at his death to found a free library in the city of New York, donating his private library of 15,000 volumes as a beginning. A number of heirs contested the will, though it had been drawn up by himself, and after long litigation a compromise was made in 1894 by which the gift was reduced to $2,250,000. In 1895 the Astor and Lenox libraries were united with that established by Tilden, which is known as the New York Public Library with the Astor, Lenox, and Tilden Foundations. Tilden never married.

TILE, a flat or curved sheet of clay that has been baked for use in covering roofs and floors. Tiles are made for a variety of purposes and in construction differ vastly according to the use for which they are intended. Drain tiles are cylindrical, usually twelve inches long, but the larger sizes are two feet in length. Small tiles for draining, ranging from three inches to twelve inches in diameter, inside measurement, are made chiefly of clay, while large tiles, from fifteen inches to three feet in diameter, are now made largely of concrete. Tiles used to cover floors are of a variety of colors and when worked to a special pattern they give a pleasing as well as durable effect. Roof tiles overlap each other like slates.

TILLMAN (tĭl'măn), **Benjamin Ryan,** public man, born in Edgefield County, South Carolina, Aug. 11, 1847; died July 3, 1918. He attended school at the time of the Civil War, but left school to join the Confederate army in 1864. After a severe illness, he lost his left eye and was an invalid for two years. After the war he engaged as a planter in his native State, and in 1886 became prominent as an advocate for reforms in technical and industrial affairs. He was elected Governor of South Carolina in 1890 and 1892, and in 1895 became a member of the United States Senate. He was reëlected in 1901 and 1907. In both houses of Congress he was on important committees. He founded Clemson Agricultural and Mechanical College at Fort Hill and Winthrop Normal and Industrial College at Rock Hill, the former for boys and the latter for girls. In 1895 he took part in the movement which led to the establishment of an educational qualification for suffrage in his State.

TILLY (tĭl'lĭ), **John Tserclaes, Count of,** eminent general, born in the chateau of Tilly, in Brabant, in February, 1559; died at Ingolstadt, Germany, April 30, 1632. He descended from German parents, who placed him under instruction by the Jesuits, but he preferred the life of a soldier and began his military career under the Spanish in the Netherlands. Subsequently he served against the Turks in Hungary, but in 1610 was appointed to a command in the imperial army of Germany under Maximilian I., and soon after the beginning of the Thirty Years' War became commander in chief of the military forces organized by the Catholic League. His efficient leadership and military skill won 36 consecutive battles. He subdued Bohemia in 1620 and Palatinate in 1622, and for his services was made count by Ferdinand II.

Tilly defeated Christian of Brunswick at Stadtlohn in 1623 and Christian IV. of Denmark at Lutter in 1626, compelling the latter to retire from Brunswick to his own country. Wallenstein was obliged to retire as commander of the imperial forces, in 1630, and was succeeded by Tilly, who stormed Magdeburg in 1631 and allowed his army of Walloons and Croats to perpetrate cruelties upon the unfortunate opponents. However, his success was at an end, being met by Gustavus Adolphus at Breitenfeld on Sept. 17, 1631, and completely routed by the Swedish army. He was compelled to retreat beyond the Lech River in Bavaria, and on April 5, 1632, was severely wounded in the desperate conflict on the Lech, from the effect of which he died after being removed to Ingolstadt. Tilly ranks among the greatest military leaders of the 17th century, being efficient as a com-

mander and popular among his soldiers. His zeal for military success was not exercised because he desired personal power or aggrandizement, but on account of his devotion to Catholicism.

TILSIT (tĭl'sĭt), a city of Germany, in the province of East Prussia, 60 miles northeast of Königsberg. It is finely located on the Niemen River, has good railroad facilities, and is surrounded by a fertile fruit-growing and farming country. Among the manufactures are leather, glass, clothing, and lumber. It has a considerable trade in lumber, grain, and dairy products. The river is navigable beyond the city. Tilsit is celebrated for the treaty concluded here in July, 1807, by which Prussia lost much territory. The city was captured and lost by the Russians in 1914. Population, 1922, 41,865.

TIMBER. See **Lumber.**

TIMBUCTOO (tĭm-bŭk'tōō), or **Tembuktu,** a trade center in the Sudan, near the southern boundary of the Sahara, seven miles north of the Niger. It occupies a site only slightly elevated above the river, and the region between it and the main channel of the Niger is frequently flooded, thus leaving a number of channels and bayous in the sandy wastes. Walls formerly surrounded the city, but they are now in ruins and almost totally destroyed. Most of the buildings are low and constructed of clay, but it has several fine architectural structures, among them the Mosque of Sankore, the Great Mosque, and several structures erected by the French, whose sphere of influence extends throughout the region. Timbuctoo owes its importance to its situation near the Niger, since reaching that stream near the city is an object sought by the many caravans passing between the Mediterranean and the Gulf of Guinea, and between the Atlantic and the interior of Northern Africa. The city was founded in the 11th century and the Great Mosque dates from 1325. Among the articles of trade are ivory, tobacco, ostrich feathers, gold dust, salt, tea, cutlery, and fruits. The inhabitants include Arabs, Tuaregs, Mandingoes, Jews, Africans, and Fulahs. French occupation has greatly increased the importance of Timbuctoo as a market. Population, 1922, 12,480.

TIME, Standard. See **Standard Time.**

TIMOR (tē-mōr'), an island of the Malay Archipelago, the largest of the Lesser Sunda Islands. It is situated southeast of Celebes, about 700 miles east of Java. The length is 280 miles; average breadth, 55 miles; and area, 12,375 square miles. It is traversed by a range of lofty mountains, some of which are volcanic, but it has a large area of fertile land. The highest summits approximate 11,800 feet, but the slopes are well wooded. Among the chief products are sugar, rice, sago, indigo, fruits, pearl oysters, buffaloes, and sandalwood. The inhabitants are chiefly Malayans, but are mixed more or less with Negroes. Politically the island is divided between Holland and Portugal. The Dutch possess the southwestern half with the capital at Kupang, while the Portuguese have the northeastern half with their seat of government at Deli. Nearly all of the Europeans reside in the portion controlled by Holland. The total population is given at 400,000.

TIMORLAUT (tē-mōr'lout), a Greek group of islands in the Malayan Archipelago, situated 240 miles southeast of Ceram, one of the Moluccas. Yamdena, Larat, and Selaru are the largest islands of the group. Though of volcanic origin, some of the islands are partly of coral formation. The total area is 2,060 square miles. Most of the inhabitants are a mixture of Malayans and Negritos. They engage in trepang fishing, agriculture, and stock raising. These islands are noted for numerous brilliantly colored birds. Population, 24,950.

TIMOTHY (tĭm'ō-thy), or **Timotheus,** a disciple of Paul, born in Lycaonia, Asia, of a Greek father and a Jewish mother. He became converted to Christianity at the time Paul visited Lystra and afterward accompanied the apostle to Philippi, Athens, Thessalonica, Rome, Ephesus, and other cities. He served on important missions in connection with the preaching of Paul. His name and that of Paul are associated in the opening of the Second Epistle to the Corinthians, both epistles to the Thessalonians, and those addressed to the Colossians and Philippians. His death, which is commemorated on Jan. 24, occurred in the reign of Domitian. Paul addressed the two Epistles to Timothy to him. These two books of the New Testament and that of Titus are called the *Pastoral Epistles.* According to tradition, Timothy was the first bishop of Ephesus, and it is asserted that he suffered martyrdom under Domitian.

TIMOTHY GRASS, a species of grass widely cultivated, which is one of the most valuable for hay. It was named timothy from Timothy Hanson, who did much to promote its cultivation in America, after it had been introduced from Europe. The seed is usually sown along with wheat, rye, or some other cereal, as a means of protecting the young plants, and the grass becomes fit for cutting the second year. It attains a height of three to five feet, is tender and nutritious, and yields one to three tons of hay per acre. The stems are cylindrical and the flowers form a seeming spike. Timothy is a perennial plant. It comprises a large part of the hay crop of the United States, and is grown extensively in Canada, especially in Ontario, but it taxes the soil more than clover. In England it is generally known as *herd's grass.* It requires considerable moisture early in the spring to develop a good crop.

TIMUR (tĭ-mōōr'), **Timur-Beg, Timour,** or **Tamerlane,** celebrated conqueror of Central Asia, born at Kesh, 40 miles southeast of Samarkand, April 9, 1336; died Feb. 18, 1405. He was the son of a Turkish chief, but by his mother descended from Genghis Khan, and his educa-

tion consisted largely of reading the Koran and extensive drills in military and industrial arts. In 1360 he was made chief of his tribe. His first extensive military experience was in freeing Turkestan from the Kalmucks, who had invaded that region, and he soon required them to recognize him chief in the government of Kesh. His career of conquest was remarkable from the beginning of his reign, overcoming tribe after tribe until he was proclaimed supreme ruler at Samarkand in 1369. Timur, having rising to supreme power in Turkestan, led a powerful army into Afghanistan, captured Herat, and made a triumphant march toward the southwest into Persia. After subduing the Persian chiefs, he invaded Mesopotamia, then Syria and Caucasus, and penetrated into Europe as far as Moscow. By these conquests he extended his dominion from the walls of China to Moscow.

Timur began an invasion of India in 1398 and made Delhi and all of northern India tributary. Subsequently he proceeded east to Burmah, subduing the Burmese prince. However, he soon returned to settle internal disputes at Samarkand, but immediately after commenced an invasion of China. He began his long march with a large army, with the view of reaching the Jaxartes River, proceeding down its course to Otrar, where he was suddenly seized with ague and died. His reign of 35 years is one of the most famous enjoyed by Asiatic rulers, and the cruelty, bloodshed, and devastation committed by his armies are without a parallel in history. He rose from the rank of a petty chief to become the ruler of the region extending from Moscow to Burmah and from the Red Sea to the Altai Mountains. The cities plundered by him include Damascus, Bagdad, Aleppo, and many others of Asia Minor and the region of the Volga. He boasted, "Since there is but one God in heaven, so there ought to be but one lord on earth." Though a cruel tyrant, he patronized science and art, constructed vast internal improvements, gave gorgeous festivals, and is the reputed author of two works, entitled "Autobiography of Timur" and "Institutions of Timur." Some writers question the authenticity of the writings attributed to Timur, since they have been preserved in Persian, and it is quite probable that they were prepared by some scholars closely associated with him.

TIN, a silvery-white and highly lustrous metal. It has a specific gravity of about 7.3. Tin is found in two ores—the native dioxide, called *tinstone,* and a sulphide of copper and tin, called *tin pyrites.* The only workable ore is the dioxide. The ore is crushed and the dioxide is separated from the lighter earthy matters by washing in a stream of water, and to expel the sulphur and arsenic the dioxide is roasted in a furnace. In this partially purified state it is mixed with charcoal and fed into a cupola furnace, where the combustion is supported by a blast of air. The reduced tin collects in the refining basins, where it is stirred in order to disperse the gases, which tends to reduce any oxide that has been formed and to bring foreign matters to the surface of the molten metal. The tin is further purified by melting at a moderate heat on the inclined hearth of a reverberatory furnace, and is made to pass into a cavity prepared for it, while the less fusible metals remain on the hearth. It is next cast into blocks, called *block tin,* while the purest specimens are known as *refined tin.*

Pure tin melts at 442° Fahr. It burns with a brilliant light when raised to a white heat, and at 212° Fahr. becomes sufficiently ductile to be drawn into wire. Air at ordinary temperatures does not affect it, but it absorbs oxygen when melted, and may be converted into the dioxide by stirring when in the melted condition. Nitric acid converts it into dioxide, giving off torrents of red vapors. A bar of tin produces a peculiar noise when bent, due to the sliding of the crystals over one another. The sound thus produced is called the *cry of tin.*

Tin is probably one of the earliest known metals. It was obtained by the Phoenicians from Sicily and by the Romans from Spain, but the principal tin mines are in England, China, India, Australia, Bolivia, and the Malay Peninsula. Large deposits of native dioxide occur in Bohemia, Germany, Bolivia, Australia, and the Straits Settlements. Limited quantities are obtained in a number of the states, particularly in California and Missouri, but the tin used in the United States is quite largely of foreign importation. In 1922, England produced 4,500 tons of tin; Australia, 4,042 tons; Bolivia, 16,890 tons; and the Straits Settlements, 58,385 tons. In that year the United States imported 75,068,568 pounds, valued at $21,500,000.

Tin is a highly useful metal, being employed in the manufacture of tinfoil, a product used for enveloping chocolate, tobacco, and other manufactures. It has an important use for tinning iron and copper, which is done by dipping the perfectly clean objects into a bath of molten tin. Its resistance to the action of vegetable acids renders it of economic value in coating knives, forks, spoons, and other household utensils. A number of alloys of tin are utilized, such as plumbers' solder, which is an alloy of tin and lead, and gun metal, bronze, and bell metal, which are alloys of tin and copper. Tin plating is a simpler process than gold plating, but is done similarly, the tinfoil being prepared by rolling cast tin into plates, after which they are beaten and doubled as in goldfoil.

TINDER, a material used for kindling fires before the invention of matches. It is made of half-burned linen, partially decayed wood, and certain fungi, the last named furnishing the so-called *German tinder.* In kindling fires with tinder, it is necessary to have materials that cause sparks by striking, such as a piece of steel with a flint, and the spark is made to ignite the

tinder, which in turn inflames a match dipped in sulphur.

TINTORETTO (tĕn-tō-rĕt'tō), eminent historical painter, born in Venice, Italy, in 1518; died there in 1594. He was the son of a dyer, hence was called Tintoretto, his real name being Jacopo Robusti. He first studied under Titian, but soon began to paint independently, and may be said to have acquired skill in his profession by his own efforts. The excellent landscapes and portraits painted by him in his studio soon made him famous in Venice, where his works were counted among the most popular. He painted so rapidly and such varied subjects that his fellow townsmen were kept busy examining and discussing the works as they proceeded from his studio. Nearly all the famous collections of Europe include paintings by him, and in the Venetian halls they are still among the most popular. His most famous works are "Belshazzar's Feast," a fresco, "The Miracle of Saint Mark," "The Last Judgment," "The Last Supper," "The Slaughter of the Innocents," "The Worship of the Golden Calf," "The Crucifixion," "Paradise," and "Tiburtine Sibyl." His "Paradise" is one of the largest of biblical paintings, being 74 feet long and 34 feet high, and containing 115 figures.

TIPPECANOE (tĭp-pē-kà-nōō'), a river in northern Indiana, which rises in Lake Tippecanoe and, after flowing 200 miles toward the southwest, joins the Wabash eight miles above Lafayette. It was made famous in history by a battle fought on its banks on Nov. 5, 1811, when General Harrison routed the Indians under Elskwatawa, brother of Tecumseh, who was assisted by the chiefs Stone Eater, White Loon, and Winnemac. General Harrison gained considerable prestige in this battle, and when he was a candidate for President, in 1840, the cry "Tippecanoe and Tyler, too," became popular. Battleground, a village in Tippecanoe County, Indiana, is near the site of the battle. The valley of the Tippecanoe is highly fertile, producing cereals, grasses, and fruits.

TIPPOO SAHIB (tĭp-pōō' sä'hĕb), or **Tipper Sahib,** Sultan of Mysore, son of Hyder Ali, born in 1749; died May 4, 1799. His early training was under the supervision of Mohammedans. While in the military service of his father, he came in contact with French officers, who taught him European military tactics. He demonstrated much skill in commanding the native forces against the British at Perimbakum, in 1780, and gained a second victory over them in Tanjore two years later. The death of his father, in 1782, placed him on the throne as Sultan of Mysore, and the following year he reduced the British garrison at Bednore, but the peace between France and England, concluded at Versailles in 1783, induced him to make a treaty of peace with the British. A second war between his forces and the British broke out in 1790, and, when the latter invaded Mysore, he retaliated by invading the region contiguous to Madras. He was finally compelled to sign a peace treaty in 1792, by which he was required to pay 33,000,000 rupees and relinquish half of his territory. An alliance with France was contemplated at the time Napoleon invaded Egypt, and the British immediately declared war upon him and compelled him to retreat to Seringapatam. In the assault upon his capital under General Baird, Tippoo resisted bravely, but was slain.

TIRLEMONT (tĕr-l'-môn'), a city in Belgium, on the Geete River, 31 miles east of Brussels. It is conveniently connected by railway with European trade emporiums, has numerous manufactures, and is surrounded by a fertile region. Among the noteworthy buildings are the Church of Saint Germain, the Church of Notre Dame du Lac, and the city hall and jail. The city is celebrated on account of a success of the French under Dumouriez over the Austrians in 1793. Population, 1922, 18,540.

TIRYNS, an ancient city of Greece, near the Gulf of Argolis, a short distance southeast of Argos. It belongs to the prehistoric period of the Achaean race and is supposed to have been founded by Proetus, a legendary king of Argolis. The city was the home of Hercules and the refuge of the Cyclops, who built massive walls of solid masonry. Tiryns is thought to have reached its greatest splendor in the 11th and 10th centuries B. C., but it remained a powerful city until 468 B. C., when it was destroyed by the people of Argos. Schliemann made excavations on its site in 1884 and found remains of Greek palaces dating from the 10th century B. C. Some of the finest specimens of Cyclopean architecture extant were secured from its remains, among them a fine frieze of white alabaster. This relic is studded with enamel and glass, and the decorations are interlaced with fine sculptures in relief. Remains of walls and palaces indicate elaborate and substantial stone masonry.

TISCHENDORF (tĭsh'ẹn-dôrf), **Lobegott Friedrich Constantin von,** eminent theological writer, born in Lengenfeld, Germany, Jan. 18, 1815; died in Leipsic, Dec. 7, 1874. He studied theology and philology in the University of Leipsic, where he began to write on biblical themes, and in 1828 published his novel entitled "May Buds." Subsequently he taught as a private tutor in the vicinity of Leipsic, published an edition of the Greek Testament, and spent the period from 1841 to 1844 in examining the principal libraries of Europe with the view of preparing works on theology. He made three trips to the East after 1844, where he visited the principal monasteries and libraries, and subsequently published "Travels in the Orient" and "Views and Sketches of the Holy Land." For these travels and publications he received aid from the government of Saxony and the Czar of Russia.

While in the East he discovered 43 leaves of a

Septuagint manuscript dating from the 4th century, and, together with other valuable manuscripts of antiquity, deposited it in the library of the University of Leipsic. He was made professor of theology and biblical paleography at Leipsic in 1859 and soon after made a journey to Mount Sinai, where he discovered the famous "Codex Sinaiticus" at the convent of Saint Katharine. He was made a hereditary noble by Alexander II., after which he signed his publications as Constantin von Tischendorf, and subsequently he aided in preparing several editions of works to be issued by Baron Tauchnitz. Among his writings not named above are "Evangelica Apocrypha," "Synopsis Evangelica," and "When Were Our Gospels Written?" He contributed to the *Vienna Yearbooks* and aided others in editing several works in Latin and Greek.

TISSOT (tē-sō′), **James Joseph Jacques,** born at Nantes, France, Oct. 15, 1836; died Aug. 9, 1902. He studied in Paris at the École des Beaux Arts, made his first exhibit in 1859, and in 1866 won a medal at the Salon. In 1871 he left France on account of having favored the Commune, and spent twelve years in England, where he became known extensively as an etcher and genre and portrait painter. He went to Palestine in 1886, where he spent ten years in painting, chiefly water-color works representing the life of Christ and views in the Holy Land. These productions are among the finest of their class, representing faithfully and in detail the cities, buildings, and environments of Christ while on earth. Among his chief paintings are "Young Women in Church," "A Young Girl in a Boat," "An Interesting Story," "Meeting of Faust with Marguerite," and "The Captain's Daughter."

TISSUES (tĭsh′ūz). See **Connective Tissue.**

TISZA (tē′sō). **Koloman von,** statesman, born in Geszt, Hungary, Dec. 16, 1830; died in 1902. He was liberally educated in the sciences and law and entered the civil service, but, on account of favoring the Revolution of 1848, lost the support of the governing party. In 1855 he received a semiecclesiastical position, and as such officer became known as an opponent of the religious intolerance practiced by the government. In 1860 he was elected to a seat in the parliament of Hungary, where he succeeded Count Teleki as a leader of the opposition. He was long an opponent of the *Ausgleich,* but in 1875 united with Déak in organizing the new liberal party. He was made minister of the interior in 1875 and before the end of the year became prime minister in the cabinet of Hungary. During the War of 1876-1878, he opposed Russia in its Balkan policy, and for fifteen years was a leading factor in the government of Austria-Hungary. In 1890 he retired from the ministry, but still continued to hold a seat in the parliament and exercised a wide influence.

TITANIUM (tī-tā′nĭ-ŭm), a metallic element discovered in 1789, so named from the Titans. Although it was first discovered by William McGregor, Berzelius was the first to separate this metal in a state of purity. It occurs as a mineral in three forms—as brookite, which crystallizes in the trimetric system, and as anatase and rutile, both of which crystallize in the dimetric system, although with different angles. Titanium is a heavy, dark green powder, and burns with a brilliant white flame. The hardness and strength of steel is increased by adding a small quantity of this metal. It is employed to some extent in the carbon points of arc lamps and to increase the luster of silver. This metal is found in many parts of North America and Europe, especially in Vermont, New Hampshire, New Brunswick, England, and Germany.

TITANS (tī′tanz), in Greek legends, the powerful sons and daughters of Uranus (heaven) and Gaea (earth). Hesiod mentions the male Titans as Cronus, Oceanus, Crius, Coeus, Iapetus, and Hyperion; and the female Titans as Rhea, Theia, Phoebe, Themis, Tethys, and Mnemosyne, to whom some writers add Dione. They were urged by their mother to form a conspiracy under Cronus against their father because he had assigned the Giants to Tartarus, the portion of the lower world that served as the subterranean dungeon of the gods. A wound inflicted upon Uranus caused the blood to flow profusely upon the earth, and from it sprang a race of monstrous beings called *Giants.* Cronus, assisted by his fellow Titans, succeeded in dethroning his father, who, enraged at his defeat, foretold that a similar fate would fall upon his rebellious son. On being invested with supreme power, Cronus assigned all the Titans' offices to persons of distinction, making them subordinate only to himself. However, when once secure in his position, he made war upon his assistants and allies and, with the help of the Giants, succeeded in sending those that resisted his authority into the lowest depths of Tartarus. Subsequently Zeus overthrew all the Titans and confined them in a dungeon below Tartarus, where they were guarded by Hecatoncheires, meaning the hundred-handed.

TITHES (tīthz), a tax of one-tenth of the profit derived from the use of land. The name is from the Anglo-Saxon word *teotha,* meaning *a tenth part.* Formerly tithes were levied very extensively for the assistance of the poor and to support religious worship, but at present this form of taxation is not in extensive use. It is mentioned in Gen. xiv, 20, and was levied among the Jews to support the Levites, the priestly class. The second council of Tours, in 567, passed the first enactment for that purpose, and it was afterward enforced under pain of excommunication. Later other countries of Europe established this system of taxation, the first constitutional decree of a synod in England dating from 786. After that time all the lands, except those of the crown and of the church itself, were tithable, but after the Reformation many of the

church lands were exempted as a condition of sale of these lands to private owners. These partial exemptions caused those who were required to pay the taxes to become dissatisfied and they made a complaint for two centuries. Since the year 1200 all landowners in England have been required to pay tithes for the support of the clergy in their respective parishes, but the payment is now in money instead of a part of the products.

The Roman Catholic clergy collect tithes in Quebec, under a French law which is still enforced. No tithes were ever levied in the United States, except by the Mormon church, which levies tithes under a system that is modeled after the Jewish law. Some Protestant denominations, as the Adventists, voluntarily pay one-tenth of their income to the support of the church.

TITHONUS (tĭ-thō′nŭs), in Greek legend, a brother of Priam. He was carried off by Aurora (the Daion), who bore him Memnon. Later he received from the gods the gift of immortality. Homer relates that Aurora forgot to ask the gods to bestow eternal youth upon him, hence he became helpless in old age, but was finally transformed into a cicada.

TITIAN (tĭsh′ăn), or **Tiziano Vecellio,** distinguished painter of the Venetian school, born in Pieve di Cadore, Italy, in 1477; died in Venice, Aug. 27, 1576. He displayed remarkable interest in art and painting pictures in color while yet a child, and was taken to Venice by his father, where he studied under Giovanni Bellini and other artists. Giorgione was his fellow-student and friend, and at his death, in 1511, Titian finished some of his pictures. The styles of Titian and Bellini were very similar, and the painting entitled "Homage of Frederick Barbarossa to Pope Alexander III.," begun by the latter, was finished by Titian with remarkable trueness to the basic work. He was invited to Padua in 1511, where he executed several famous frescoes still well preserved. In 1523 he frescoed "Saint Christopher Carrying the Infant Christ" in the ducal palace of Venice, and in 1532 painted at Bologna a portrait of Emperor Charles V., receiving for the latter an appointment as Count Palatine and Knight of the Golden Spur.

He accompanied Charles to Spain soon after and spent three years in Madrid, where a number of his masterpieces are in a good state of preservation. In 1550 he executed the portrait of Philip II. of Spain, who patronized him as warmly as had his immediate predecessor, and about the same time he completed the famous group containing paintings of Pope Paul II., Duke Octavio Farnese, and Cardinal Farnese. Titian worked incessantly to an advanced age, and the frescoes and paintings executed by him are very numerous. They exhibit remarkable accuracy in coloring and fine inventive skill. His landscapes, portraits, frescoes, and sacred objects take an equally high rank. Among those of note not mentioned above are "The Virgin and San Tiziano," "The Assumption of the Madonna," "Christ in the Garden," "David and Goliath," "Descent of the Holy Ghost upon the Apostles," "Venus and Adonis," "Saint Margaret with the Dragon," "Victory of the Venetians over the Janizaries," "Martyrdom of San Lorenzo," "Christ Crowned with Thorns," "The Virgin and Child with Saints," and "Diana and Her Nymphs."

TITICACA (tĭt-ē-kä′kä), a lake in South America, on the boundary between Peru and Bolivia, about 200 miles from the Pacific. The length is 130 miles; width, 35 miles; and elevation above sea level, 12,575 feet. It receives the inflow from many small streams, but has no outlet to the sea, discharging into Lake Aullagas, from which the water finally evaporates in salt marshes. The lake abounds in valuable fish and contains a number of islands. It has an area of 3,275 square miles. In the vicinity of the lake and on a number of the islands are ruins dating from the prehistoric period of America, the extent and workmanship of which give evidence of a higher civilization than that found when the region was explored by the Spanish. Some of the ruins contain remnants of substantially constructed walls, finely sculptured blocks of stone, and figures of men and animals cut on the sides toward the interior. The lake was navigated by steamboats as early as 1871, the vessels being carried across the country in pieces and put together at the lake shore. Several railroad lines now extend to the vicinity of the lake, one from Cuzco and another from Arequipa. Puno is the principal railroad town and lake port on the western shore.

TITLARK (tĭt′lärk), or **Pipit,** a class of birds resembling the larks both in habit and appearance, closely allied to the wagtails. The *meadow pipit* is the smallest and most widely distributed of the species. It is dark olive-brown, with greenish markings on the upper parts, and brownish-white beneath. The greenish tint on the back becomes more conspicuous in the autumn. Its body is about six inches long, the wings are very long, and the tail is slightly notched. The nests are built on the ground, usually in a tuft of grass. Another species common to America is the so-called *American titlark,* which closely resembles the water pipit of Europe. These two species are the only ones native to America, but there are fully fifty species in the genus, and representatives are found in nearly all countries of the world. They usually lay five or six eggs, both sexes incubating.

TITLE, in law, the term used to designate ownership of property, based upon all the elements which constitute title to real estate or personal property. It involves the elements of possession and the right of possession, and is based either upon title by descent or by purchase.

Inheritance is the single mode of acquiring title by descent, while all other methods refer to title by purchase. However, the death of the owner operates to transfer property in various modes, which may be classed as by will, by descent without will, by occupancy, and by verbal gift, though the amount transferred by the last mentioned method is limited to personal property.

Title by *purchase* is based upon original acquisition, as by finding or government grant; *lapse of time,* as by possession for a certain length of time; *eminent domain,* as taking land for public use; and *conveyance,* as by gift or sale. In the sale of real estate it is essential to examine the title set out in a statement called an *abstract of title.* Such a statement contains a complete history of all the transfers that have been made from the beginning or from some public act, as of a legislature. It shows whether any taxes or assessments are unpaid, what mortgages or judgments affect the title, and the nature of the title of the grantee in the property. An abstract of title is required under the law of England, and it is usually given voluntarily in Canada and the United States.

The term *title* is applied in legislation to that part of an act by which it is known and distinguished from other acts. It is a requirement in most states and countries that the subject of every act be expressed in the title thereof. The term *title* is applied in pleading to the words whereby a particular suit at law is designated. It consists in most cases of the name of the court, the venue, or place of trial, and the parties to the same.

TITLES OF HONOR, the designations by which persons are addressed in consequence of some office or dignity in their possession or inherent in them. They were used to a limited extent among the Greeks, but the Romans bestowed them more freely upon their public officials. The honorary title of *Magnus* pertained to the descendants of Pompey, while those of *Africanus* and *Asiaticus* had reference to those who descended from Scipio. Some offices carried their titles with them, independent of the merits or services of the incumbent, as the words *Caesar* and *Augustus.* These originally were family names, but they came to be applied to all who held the imperial throne of Rome.

Many titles are in use at present, but they are confined chiefly to monarchical governments. Those applied to chief rulers are termed sovereign titles, as *King of England* and *Emperor of Austria.* The Russian title *Czar* and the German title *Kaiser* were derived from Caesar and correspond to emperor. *Mikado* is the title used in Japan, and *Sultan* and *Shah* are sovereign titles of Persia and Turkey. Minor titles include duke, prince, marquis, archduke, viscount, baron, knight, baronet, esquire, and chevalier. It is customary to prefix certain terms before the title, as majesty, royal highness, his excellency, etc.

TITMOUSE (tĭt'mous), or **Tit,** a subfamily of birds belonging to the warblers. They are remarkable for their boldly defined color, quick movements, and skill in flitting from tree to tree. They feed on grain, seeds, and insects, catching the last named while on the wing. The female defends its nest and young with much courage. It has been observed that a pair of blue tits carry flies and other pests to their nests every few minutes, thus making them extremely serviceable in the destruction of obnoxious insects, especially caterpillars. The American species include the tufted titmouse, the chickadee, the bush tit, and the verdine. The *tufted titmouse* is the largest of the American species and the *verdine* is one of the most beautiful, having a yellow head and chest and a grayish back. Among the species native to Europe are the *blue tit,* called also *tomtit,* the *great titmouse,* the *hanging tit,* and the *bluecap tit.* Most tits have a shrill and wild voice, but imitate the voice of other birds.

TITUS (tī'tŭs), an assistant and disciple of Paul, to whom the latter addressed the Epistle to Titus, one of the three pastoral epistles of the New Testament. He was of Greek birth and was probably converted at Antioch in 51 A. D., when Paul preached in that city, and later accompanied him from that place to Jerusalem. It is believed that he was present at the first council that recognized Gentile converts as part of the church and exempted them from certain burdens of the Mosaic ritual, this being attested by Paul's refusal to require Titus to be circumcised. Paul subsequently sent Titus to Ephesus, in 56, and later to Corinth. According to tradition, Titus became the first Bishop of Crete, where he died a natural death at an advanced age.

TITUS, Arch of, a triumphal arch on the Sacred Way, in Rome, facing the Forum. It was erected in 81 A. D. by Domitian to commemorate the capture of Jerusalem by Titus. The material used is chiefly Pentelic marble. It is adorned with reliefs to represent the triumph of Titus, and contains a representation of the seven-branched candlesticks and the shewbread upon the table.

TITUS, Epistle to, a book of the New Testament, written by Saint Paul to Titus. It is included with the two epistles to Timothy in the writings termed pastoral letters. Titus appears to have been left in Crete, and the apostle laid down certain rules of conduct and warned him against certain false teachers. He describes the virtues that become all classes, warns against idle speculations, and encourages obedience, gentleness, and moderation.

TITUS, Flavius Sabinus Vespasianus, emperor of Rome, eldest son of Vespasian, born in Rome, Italy, Dec. 30, 40 A. D.; died Sept. 13, 81. He was brought up at the court of Nero, where he secured the benefits of a liberal education in literature, history, and philosophy, and became

noted as an accomplished scholar. He was given a military appointment in Germany and Britain, and later served under his father in Judea as commander of a legion. Vespasian became emperor in 69 and Titus remained in Asia to conduct the Jewish war, which ended by the capture of Jerusalem in 70. He visited Arabia and Egypt soon after, returning thence to Rome, where he was given a triumph by the joyous populace. His father made him joint ruler of the empire, and on the death of the former, in 79, he succeeded to the Roman throne.

Titus disappointed the people in the early years of his government by acts of tyranny and by spending much time in pleasure, but when he succeeded to full control his government became one of marked justice and liberality. He invited scholars to Rome, corrected many abuses in the civil service, erected splendid public buildings, constructed the Colosseum and the Baths of Titus, and instituted great public games. The celebrated eruption of Vesuvius, in 79, buried Pompeii and Herculaneum, and the following year a widespread fire destroyed many of the finest buildings of Rome, including the capitol and Pompey's theater. These calamities were followed by a dreadful pestilence. Titus immediately opened the public treasury to relieve the suffering of the people, and even spent his own fortune that their hardships might weigh less heavily upon them, thus making himself one of the most benevolent and philanthropic rulers of Rome. His death occurred in his villa at Reate, in the Sabine country, and he was succeeded by his brother, Domitian. He is the accredited author of poems and tragedies in the Greek.

TITUSVILLE (tī'tŭs-vĭl), a city of Pennsylvania, in Crawford County, 18 miles north of Oil City, on the Pennsylvania and a line of the New York Central railroads. It is finely located on Oil Creek and is the center of a coal and oil producing region. Among the features are the high school, the public library, the city hall, several large oil refineries, and a number of fine schools and churches. The manufactures include machinery, radiators, hardware, chemicals, oil, and earthenware. It has good municipal facilities, such as sewerage, waterworks, electric lighting, and street pavements. The first oil well in the United States was sunk and operated here in 1859. Titusville was settled in 1796 and chartered as a city in 1866. Sixty lives and much property were destroyed by a flood and fire in 1892, when several oil tanks were burned. Population, 1900, 8,244; in 1920, 8,432.

TIVOLI (tĭv'ō-lĭ), a city in Italy, on an elevated slope of Monte Ripoli, 17 miles northeast of Rome. It occupies a site on the Teverone River, the ancient Anio, which joins the Tiber near Rome. The streets are mostly narrow and tortuous, but it has a number of fine buildings, among them the cathedral, known anciently as the Temple of Hercules, which served as a court in the time of Augustus. Near the Teverone River, which has a magnificent falls at Tivoli, is the Temple of Vesta, a structure dating from 70 B. C. In its vicinity are remains of baths, mausoleums, aqueducts, and villas dating from the time of the Roman emperors, especially that of Hadrian. The city is thought to have been founded in 446 B. C. and is mentioned in the poems of Virgil, Propertius, Horace, and Catullus. It was a favorite resort of Numidicus, Scipio, Marius, and other Romans. Here Queen Zenobia of Palmyra and King Syphax of Numidia spent their last days. Beautiful gardens, orchards, and vineyards surround it, giving the city a most pleasing appearance, especially when the orchards are decked with flowers in the spring and laden with fruit in autumn. Population. 1922, 12,108.

TOADFLAX, a genus of plants found in the temperate and colder regions. It grows both in fields and highways, and in some sections is considered a troublesome weed. The stem is from one to three feet tall and has narrow leaves. The yellowish flowers appear on a terminal spike. Locally it is called *snapdragon* and *butter-and-eggs.*

TOADS, a genus of tailless amphibians allied to the frogs, but differing from them in having a thicker and more clumsy body. The hind legs are short and the toes are slightly webbed, thus making it impossible to leap with facility. The common toads have toothless jaws and rounded muzzles, and the skin is covered with warts containing glands that secrete a yellowish, irritant fluid. They spend most of their time in moist and shady places, but come out in the evening in search of food, which consists of insects, worms, and small shelled animals. The winter is spent in a hole or other place of hiding, in a torpid state, from which they emerge after the return of warm weather in the spring

TOADS.
1, Common toad; 2, Natterjack toad; 3, Surinam toad.

They are scarcely able to swim, their feet being insufficiently webbed, and they take to water only to deposit their eggs. The eggs are laid in spring and are fertilized externally at the moment of extrusion, and, like those of the frog, are held in a gelatinous tube or envelope, which is coiled spirally in the water. Tadpoles similar to those of the frog soon develop, and they become toads on shedding their gills and tails. Toads are useful for the destruction of insects and grubs in gardens, which they catch by suddenly protruding the tongue, and for that purpose are kept in some of the larger gardens and hothouses. They may be tamed and trained to act with considerable intelligence. Many widely different species have been described. They are found in all the continents and larger islands, though their occurrence is rare in Australia and the Celebes. Ten species are native to North America.

TOBACCO (tō-băk'kō), a widely cultivated plant of the nightshade order, belonging to the genus *Nicotiana Tobacum*. The upright stem of

TOBACCO IN BLOOM.

the common tobacco plant grows to a height of three to five feet, has lance-shaped leaves fully five to eighteen inches long, and bears rose-colored and terminal flowers. The stem and leaves are covered with hairs, which are glandular and viscid at the tip. All species possess narcotic properties, for which some are cultivated extensively in the tropical and temperate zones. Tobacco is native to the tropical regions of America, and was unknown in Europe prior to the discovery of the New World by Columbus. The genus is called *Nicotiana* from a Frenchman named Jean Nicot, who sent seeds of the plant to France in the time of Catherine de' Medici. It probably came to be called *tobacco* from Tobaca, an island near Trinidad, whence a Spaniard introduced it into Portugal and Spain in 1559. From the Spanish peninsula it was successively introduced into France, Germany, Denmark, and England.

Uses of Tobacco. The smoking of tobacco was practiced in America at the time of its discovery, but the plant was first used in Europe in the form of snuff, smoking being introduced later by Sir Walter Raleigh. The use of tobacco was opposed by many priests, sovereigns, and learned men, and the practice was met by the severest opposition. Users of tobacco were tortured in Russia, executed in Turkey, and fined and imprisoned in Switzerland, and Popes Urban VIII. and Innocent IX. issued bulls against it. James I. of England published a proclamation against the use of tobacco, describing it as harmful to the brain, hateful to the nose, dangerous to the lungs, and injurious to the eyes. However, the tobacco habit spread alike to the high and low, among the Christians and Mohammedans, and in fact among all classes and in all countries. In America and most European countries the nature and harmful effect of tobacco upon the human system are taught in the schools in connection with the subject of physiology, and it is hoped that under a system of rational instruction the habit of using it will be entirely eradicated among the young, as well as limited generally.

Cultivation. The two classes of tobacco that are most extensively cultivated are the *Virginian* and the *green tobacco*, but allied species have been obtained by propagation. It is aimed to select for commercial cultivation the plants bearing the largest and most numerous leaves, though hardiness in enduring the climate is also an objective point. The seeds are sown early in the season in beds, and when the young plants are about four inches high they are transplanted in a field containing rich soil. Transplanting takes place about the early part of May, this depending upon the latitude and season, since the plants are easily affected by frost. The young plants are placed in the ground in rows about four feet apart, thus facilitating cultivation by machinery. It is necessary to guard against injury by insects, especially the tobacco worm, a caterpillar which is fond of the leaves. The stalks are topped and freed from false leaves or suckers appearing at the bottom, the purpose being to direct the growth of the plant so as to develop the largest leaves possible.

The plants mature in about three months after being transplanted, and they are then cut immediately above the ground and hung in the tobacco barn with heads downward. Tobacco barns are buildings with the sides and ends open, thus allowing the air to pass through freely. In some countries the barns are inclosed and the plants are dried by means of artificial heat, usually 100° at first, and later the temperature is raised to 175°. The portion having a light and even color is considered of the finest flavor and brings the highest price in the market. When thoroughly

dried, the tobacco is crated and transported to the manufacturer.

Tobacco is grown in North America chiefly from Florida to Wisconsin and along the Atlantic coast as far north as New Brunswick. However, the finest quality comes from Cuba. Other countries that yield large quantities include China, Japan, Greece, Russia, Germany, France, Borneo, the Philippines, Ceylon, Brazil, Porto Rico, Algeria, Argentina, and Hungary.

MANUFACTURE. The manufacture of products from tobacco is one of the great industries, involving a large capital and employing many thousands of laborers. When taken to the factory the leaves are cleansed with salt and water and the midrib of the leaf is removed. The largest and finest cured leaves are set aside for *cigars*. Other grades are used for *smoking* tobacco and for *snuff*. Snuff is made largely of the midrib, and the inferior grades of smoking tobacco are obtained from the smaller leaf ribs and waste in cigar making. *Plug*, or *chewing*, tobacco is chiefly manufactured from a middle class of leaves, which are moistened and pressed into cakes or sticks. *Cheroots* are made by rolling leaves in the shape of a slender cone, and *cigarettes*, by inclosing small particles of tobacco in a tubular paper wrapper. It is estimated that 875,000,000 people use tobacco and that the total annual consumption of the world reaches 2,550,000 pounds. The annual consumption in the United States is given at 1,250,000,000 pounds. Large quantities of cigars are smoked in Canada and the United States, while snuff, cigarettes, and pipe tobacco are used more commonly in Europe. Tobacco is consumed more extensively as a sedative, or narcotic, than any similar substance, but it is rivaled by opium and next by hemp.

TOBACCO WORM, an insect which attacks and destroys the leaves of tobacco. It is the larva of a large green caterpillar, but is known as the tobacco worm while in the larval state. The pupa of this insect lies dormant in the ground during winter and the caterpillar comes out in May or June, when it begins to lay eggs on the under side of the tobacco leaf. As soon as the larvae hatch they begin to feed upon the plant, and do much damage by feeding vigorously. One or two broods appear each summer, depending upon the region where the tobacco is grown.

TOBAGO (tō-bā′gō), an island in the West Indies, situated 20 miles northeast of Trinidad and classed with the Windward group. The area is 114 square miles. It is of volcanic origin, has peaks elevated about 2,000 feet above the sea, and the general surface is mountainous. A large part of the island has a fertile soil, suitable for the cultivation of coffee, cotton, tobacco, and sugar cane. The plants resemble those of Trinidad and the northern part of South America. Columbus discovered the island in 1498. It was settled by the Dutch in 1632, but has been a British possession since 1763. For the purpose of government it is a dependency of the colony of Trinidad. Scarborough is the capital and principal port. About 200 of the inhabitants are whites. Population, 1922, 18,858.

TOBOGGAN (tō-bŏg′gan), a vehicle for coasting upon the snow and ice. It differs from a sled in that the bottom is flat and is not provided with runners. Toboggans were used originally by the Indians of Canada to convey dead game over the new snow. They constructed these vehicles of slabs of birch. This mode of construction gave them the advantage of light vehicles that could be pulled easily over loose snow and even over rough ground. Strips of whalebone are used for making toboggans among the Eskimos, and some tribes employ dried bark.

Toboggans for sporting purposes are made chiefly of thin strips of wood, such as ash or maple, and are about eighteen inches wide and six to ten feet long. They carry from two to four occupants. The vehicle is taken to the upper end of a slideway, consisting of one or more chutes, covered with snow or ice. The speedway is from 500 to 900 yards long and inclines sufficiently to permit attaining a great speed. In some cities toboggan slides are constructed in parks for the free use of children, who may use either sleds or toboggans. However, in some localities tobogganing is a private enterprise and those who take part in the pastime pay a small fee.

TOBOL (tȧ-bôl′y′), a river of Asia, in Western Siberia. It rises in the southern part of the Ural Mountains, has a general direction toward the northeast, and discharges into the Irtish near Tobolsk. The Tobol is about 745 miles long and is navigable about half that distance.

TOBOLSK (tō-bŏlsk′), a city of Siberia, capital of the government of Tobolsk, at the confluence of the Tobol and the Irtish. It is on a branch of the Trans-Siberian Railway, about 300 miles northwest of Omsk, and is the center of a large trade in furs, fish, and live stock. The chief buildings include the museum, a seminary, a gymnasium, and several churches. A monument erected to the memory of Yurmak, a Russian pioneer in Siberia, stands in the public square. It has manufactures of soap, leather, clothing, cured meat, and sailing vessels. The city was founded in 1587, hence is one of the oldest Russian settlements in Siberia. Population, 1922, 20,500.

TOCANTINS (tō-kän-tēns′), a river in Brazil, which rises in the government of Goyaz by several branches, and, after a course of 1,575 miles toward the north, flows into the Atlantic by the estuary of the Rio Pará. The principal tributary is the Araguayá, which it receives in latitude 6° south. It is eight miles wide at its mouth, and the tide affects it fully 300 miles from its mergence into the Pará. Boats ascend it for 1,025 miles, but navigation is obstructed in several places by extensive falls and rapids, particularly between the Araguayá and the Pará.

The valley is fertile and contains fine forests of valuable timber.

TOCQUEVILLE (tŏk'vĭl), **Alexis Charles Henri Clérel de,** author and statesman, born in Paris, France, July 29, 1805; died April 16, 1859. He descended from a noble family of Normandy, and, after studying law, became a successful advocate. In 1830 he was made assistant magistrate, and the following year was sent to the United States by the French government to inspect prisons and reformatory institutions. On returning to France two years later he published "Democracy in America," an able work devoted to the description of American institutions. In 1839 he entered the chamber of deputies, where he exercised considerable influence in legislative affairs. He became vice president of the assembly in 1849, served as minister of foreign affairs for a short period, and after the ascension of Napoleon III. to the throne of France, in 1851, he retired to his estate. Tocqueville was made a member of the French Academy and of the Academy of Moral Sciences.

TODLEBEN (tŏt'lă-bĕn), **Franz Eduard,** general and engineer, born at Mitau, Russia, May 20, 1818; died at Soden, Germany, July 1, 1884. He descended from German parents, studied engineering at Saint Petersburg, and in 1838 entered the army. From 1848 to 1851 he served as a military engineer in the Caucasus, where he defeated a native army under Shamyl. He was placed at the head of the staff of General Schilder-Schuldner in 1853, and when that general became wounded at the siege of Silistria he succeeded to the chief command and was transferred to the Crimea. His services in the defense of Sebastopol made his name famous. As a military leader he possessed great fortitude and ability, and was efficient in supervising the construction of fortifications. In 1860 he was made chief of engineers in the Russian army and in 1878 was given charge of the siege at Plevna, where he captured a large Turkish army under Osman Pasha. Subsequent to the war he became governor of Odessa, but retired to a health resort in Germany in 1884, dying shortly after.

TODY (tō'dy), a genus of birds found in the West Indies, related to the bee-eaters and kingfishers. The bill is long and much depressed, the wings are short and rounded, and the tail is quite short. Most of the species are small birds, not more than three inches in length, and the plumage is richly colored with green and red. The *common green tody* is native to Jamaica and is frequently called robin redbreast. Several species are found in the northern part of South America. These birds frequent damp places, living alone most of the time, and feed upon insects and the tender part of plants. They are easily approached and caught, being somewhat dull and stupid.

TOGA (tō'gȧ), a popular garment worn by the Romans, constituting the principal outer article of attire. While it differed somewhat in fashion at various periods, the general form was semicircular. One corner of the garment was placed upon the left shoulder and the remainder passed behind the body, over the right shoulder and across the breast, the end being thrown back over the left shoulder. The garment reached nearly to the feet, behind the wearer. The togas worn by officers were made chiefly of white woolen cloth, while children and both sexes wore patterns in white with a broad purple border. After the introduction of the *sola,* that garment was assigned to the women, while the toga became the peculiar distinction of Roman men. Exiles and foreigners were not permitted to wear it. In the home the *tunica* was regarded sufficient, but the toga was worn out of door, and later more convenient garments of foreign origin were added to the costume.

TOGO (tō'gŏ), **Heihachiro,** naval commander, born in Japan in 1847. He received training at the national naval school at Heigakuryo and subsequently in England, at the Thames Nautical Training College. By successive promotions he rose to the rank of rear admiral, and in the war with China in 1894-1895 he commanded the *Naniwa.* He was commander in chief of the Japanese fleet during the Russo-Japanese War of 1904-1905, and had personal charge of the squadron that annihilated the Russian Baltic fleet under Admiral Rojestvensky in the Sea of Japan, May 27-28, 1905. His successful exploits entitle him to distinction as the naval hero of the war.

HEIHACHIRO TOGO.

TOGOLAND (tō'gŏ-lănd), a former possession of Germany, situated on the Gulf of Guinea, between Dahomey and Ashanti. The coast is only 32 miles long, but inland the country broadens considerably. It has an area of 33,750 square miles. The Volta River forms a part of the western boundary and is the principal stream, but there are numerous others of more or less importance. The country has a general rise from the coast toward the inland, the surface being low and level along the gulf and considerably elevated in the northern part. Among the principal productions are coffee, maize, wheat, rye, barley, ivory, palm oil, gums, and many varieties of fruits. Fine forests are abundant, including the rubber tree, oil palms, cocoa, and dyewoods. The native manufactures embrace textiles, pottery, clothing, and utensils. Togoland has a considerable trade in native products, and imports cotton goods and machinery. The region is not only self-supporting, but yields a fair revenue. The government is ad-

ministered by commissions, in part by France and in part by Great Britain. Togo is the principal native town. Togoland became German territory in 1884; the British captured it in 1916. Population, 1922, 2,050,540.

TOKAT (tō-kät′), or **Tocat,** a city in Asiatic Turkey, in the vilayet of Sivas, about 60 miles south of the Black Sea and 375 miles southeast of Constantinople. It occupies a site among elevated hills, thus giving it an almost unbearable heat in the summer. The region is noted for its extensive gardens and vineyards. Tokat has a considerable trade in merchandise, fruits, camels, and textiles. The streets are mostly narrow and tortuous. Besides several cotton printing and dyeing institutions, it has several smelters for iron and copper ore. A large majority of the inhabitants are Turks. Population, 1922, 31,465.

TOKAY (tō-kā′), a town in Hungary, at the confluence of the Bodrog and Theiss rivers, 41 miles north of Debreczin. It is noted for a kind of wine made from grapes grown in the vicinity, the product being known in the market as *Tokay wine.* Vast vineyards cover the regions adjacent to the town, fully 18,000 acres being utilized for grape culture. The wine made from the Tokay grapes is of a greenish hue and possesses a fine flavor and an agreeable taste. Imitations of this grade of wine are sold in the market. Fully 1,575,000 gallons of Tokay wine are produced annually, and large quantities of it are exported to foreign countries. The town is unimportant, having a population, in 1922, of 5,870.

TOKIO (tō′kē-ō), or **Tokyo,** formerly Yeddo, the capital and most important city of Japan, on the island of Hondo, separated into two parts by the Sumida River, which discharges into the Bay of Tokio at this place. It occupies a fine site on the north shore of the Bay of Tokio, has railroad facilities, and is one of the best built cities of Asia. Most of the streets are wide and regularly platted, crossing each other at right angles. They have substantial pavements and are lighted by gas and electricity. It has an extensive system of waterworks, telephones, and sewerage, and the streets are kept clean and free from rubbish. Among the principal buildings is the court of the Mikado, who has his residence at Tokio. Among the noteworthy buildings are the mansion of the Barons of Mito, the public library, the Imperial Museum, the Temple of Sankakuji, the city hall, and the customhouse. The city contains a large number of Shinto shrines and Buddhist temples, about 800 elementary schools, and the national university. It is famous for its fine parks and gardens of flowers.

Tokio has a vast system of electric railways and large railroad and machine shops. Among the manufactures are silk goods, cotton and woolen textiles, paper, carriages, vehicles, sailing vessels, machinery, clothing, toys, and chemicals. The interior and foreign trade is considerable. The harbor, being both commodious and secure, is the seat of much activity in commercial enterprises, having steamship connections with the chief ports of the world. It has a large wholesaling and jobbing trade, both with the cities of Japan and Corea. The government is administered by a mayor, a municipal council, and a municipal assembly.

Yeddo was made the seat of the Japanese government by Iyeyasu in 1600, since which time it has continued to be the principal seat of governmental and social influences. The name was changed to Tokio in 1868, when a revolution displaced the Shogun government and established the court of the Mikado. Commodore Perry concluded a treaty between the United States and Japan in 1854, by which it became open to foreign trade. Formerly the foreign legations were confined to particular parts of the city, but the extra territoriality has been abolished. Population, 1920, 2,286,079.

TOKIO, University of, an institution of higher learning founded at Tokio, Japan, in 1868, by the union of two schools. This institution is the outgrowth of extensive reforms in politics and social affairs, and occupies a high place in the educational system of the country. It is supported by the government, under the administration of a board of councilors. The departments include those of the sciences, law, medicine, and engineering. Originally it had a faculty composed largely of foreigners, or natives trained in Europe, but at present instruction is almost exclusively in the hands of Japanese. It has a fine library, an observatory, and modern apparatus. The attendance is 5,250 students.

TÖKÖLY. See **Tekeli, Emeric.**

TOLEDO (tō-lē′dō), the third city of Ohio, county seat of Lucas County, on the Maumee River, 90 miles west of Cleveland. It is on the Wabash, the Grand Trunk, the Michigan Central, the Père Marquette, the Pennsylvania, the New York Central, the Hocking Valley, the Toledo Terminal Lines, the Ann Arbor, and other railways. Large vessels navigate the Maumee through the city, and it has an extensive harbor on Maumee Bay. Steamships of the largest size enter the city, furnishing direct communication with the leading ports of the Great Lakes. About 25 miles of docks are maintained in the harbor, a large part of which is devoted to ore and coal. A number of bridges span the river, which averages a half a mile in width, and a system of electric street railways furnishes communication with all parts of the city. A number of the electric lines extend inland to points within the State.

The city has an area of about forty square miles, extending on both sides of the river, and the business section is built largely upon ground that has been improved by grading. Originally the ground near Lake Erie and along the river was a swamp, while the settlements were made

chiefly on two hills. However, extensive improvements have made the site safe and beautiful. Shade trees ornament the residential portions and the streets are paved largely with stone, brick, and asphalt. The parks include 850 acres. Walbridge Park, on the west side, has a fine herbarium and zoölogical gardens. Bay View Park is at the point where the river enters the bay, Riverside Park is farther upstream, and Navarre Park is on the east side. Other pleasure grounds include Collins Park, Ottawa Park, and Central Grove Park. A system of boulevards leads to the outlying parks. The city has a public cemetery that is self-supporting, and other burial grounds are maintained by private interests.

The county courthouse is located in a beautiful park in the central part of the city, which contains a fine statue of President McKinley. Other features include the Safety Building, the public library, the Masonic Temple, the Soldiers' Memorial Building, the Valentine Theater, the Saint Paul's Church, the Saint Patrick's Church, the Toledo Club, and numerous office buildings. The city has about eighty public schools, including several high schools and junior high schools with well articulated courses of study. It has the Toledo University, the Saint John's College, and numerous hospitals and private educational institutions. A gallery of paintings is maintained by the Museum of Art. The public library contains 100,500 volumes.

Toledo has a large commercial and jobbing trade. It receives iron ore and lumber from the Lake Superior region of the Great Lakes, and is a distributing point for coal mined in Ohio and Pennsylvania. A fertile farming country is tributary to it, hence it is important as a market for grain, live stock, fruits, and vegetables. Among the larger industrial plants are canvas factories, blast furnaces, machine shops, glass works, clay works, and steel and iron foundries. The general manufactures include automobiles, clothing, earthenware, plate and cut glass, cigars, spark plugs, flour and grist, scales and balances, and farming implements. The city has extensive systems of waterworks, sanitary sewerage, and gas and electric lighting.

The site of Toledo was formerly occupied by the Miami Indians, who made it a central point for hunting and trading expeditions. White men made the first settlement in 1832 and the city was chartered five years later. Both Ohio and Michigan claimed the surrounding territory, and the controversy is usually known as the *Toledo War,* though it consisted only of a prolonged discussion of legal points. The settlement of the State and the construction of the Wabash and Miami canals mark the beginning of its rapid growth. About one-fifth of the inhabitants are of foreign birth, chiefly Germans, Irish, and Scandinavians. Population, 1900, 131,822; in 1920, 243,109.

TOLEDO, a city of Spain, in a province of the same name, on the Tagus River, 54 miles southwest of Madrid. It is centrally located on a number of important railroads and is surrounded on three sides by the Tagus, which flows through a region of hills and constitutes a means of defense. The side not inclosed by the river is secured by strong walls, the inner of which was built in the 7th century by the Gothic king Wamba, and the outer wall was constructed in 1109 by Alfonso VI. The streets are narrow and tortuous and wind over the hills. They are illy paved. Among the most noted buildings is a fine Gothic cathedral, completed in 1492, and in the same vicinity are several large convents and churches. It has a number of government buildings, hospitals, secondary schools, and ruins of a palace and fortress dating from the 16th century. Toledo was once a city of much commercial importance, but at present it has only a limited trade and few productive industries. The leading manufactures comprise the Toledo blades, a class of swords renowned for their fine temper for more than two centuries, but these are made under government supervision. Other manufactures include machinery, woolens, leather, paper, guitar strings, utensils, chemicals, and clothing. Toledo is a very ancient city and is intimately connected with the history of Spain. The Romans under Marius Pulvius captured it in 192 B. C., when it was important as a strategic and commercial point, and it was taken by the Moors in 714 A. D. Castile annexed it in 1085. The French occupied it from 1808 to 1813. It contained 200,000 inhabitants when in the height of its prosperity. Population, 1922, 24,208.

TOLSTOI (tŏl'stoi), or **Tolstoy, Lyof Nikolaivitch, Count,** novelist and social reformer, born in Yasnaia, Poliana, Russia, Aug. 28, 1828. His family descended from Count Peter Tolstoi, an associate of Peter the Great. After studying at the University of Kazan, he entered the Russian army in 1851 as an officer of engineers, serving throughout the Crimean War, and subsequently published "Sebastopol." He resigned from the army in 1856 to engage in literature, publishing his first noted novel in 1860. This work is entitled "War and Peace" and is one of the finest productions published in relation to the invasion of Russia by Napoleon in 1812. He published "Anna Karéniná," a highly popular novel, in 1876, and from that time devoted himself largely to a study of modern social life and religious and moral philosophy. His religious life was that of a Christian socialist, placing himself on a plane with the common people and sharing with them his life and in-

COUNT TOLSTOI.

come. In the famine of 1891 and 1892 he made large donations to relieve the suffering and was appointed agent for those contributing aid from foreign countries.

The writings of Tolstoi embrace a number of works on government, social development, religion, and political economy. Among the most important are "The Kreutzer Sonata," "The Kingdom of God Is Within You," "My Religion," "Patriotism and Christianity," "My Confession," "Two Pilgrims," "What to Do," and "The Resurrection." The last mentioned work was published in 1899 and is a treatise on the period of Russian history included between the ascension of Alexander III. and the year 1899. At the time of the Russo-Japanese War he issued several books and tracts that were unfavorable to the government, in which he advocated greater consideration for the interests of the peasants and the middle classes. Tolstoi exercised remarkable influence as a writer on social and political questions both in Russia and other countries. He wrote equally well in the Russian and German. Many of his works have been translated into European and Asiatic languages. In 1900 an edition of his works in twelve volumes was published by Nathan Haskell Dole. He died Nov. 20, 1910.

TOLTEC (tōl'tĕk), or **Tolteca,** the name of a native race in Mexico, which occupied a large part of that country before the arrival of the Aztecs. They had their capital at Tula, north of the valley of Mexico, where the Spaniards found extensive ruins at the time of the Spanish conquest. It is evident that these people were well advanced in agriculture and many of the mechanic arts. They were workers of clays and metals and invented a system of time which was later adopted by the Aztecs. They were the founders of the civilization which prevailed in ancient Mexico. It appears that they migrated from the north in the 7th century A. D. and expelled a savage race from Anahuac and that they themselves were driven out of the country by the Aztecs when that conquering tribe came from the north.

TOLTEC GORGE, a scenic cañon of the Rocky Mountains, in Colorado, on the Denver and Rio Grande Railroad. The railway line passes through a tunnel in the mountain forming the walls of the gorge, and as the train passes near the brink of the mountain side, fully 1,250 feet above the bottom of the cañon, a fine opportunity is afforded to observe the grand aspect of the walls of the gorge and the foaming water that dashes in torrents below. Few places in the Rocky Mountains present more beautiful and remarkable natural scenery. To the grandeur of the natural aspect are added the remarkable extent of trestle work and masterful ingenuity in constructing the railway through the rocks and along the edge of the precipice.

TOLUCA (tō-lōō'kȧ), a city of Mexico, capital of the state of Mexico, 35 miles southwest of the City of Mexico. It is situated on a lofty plateau, on the line of the Mexican National Railway, and has a cool and healthful climate. The streets are clean and well improved. It has manufactures of flour, cotton and woolen goods, clothing, and earthenware. Toluca is thought to have been founded by the Toltecs and it was occupied by the Aztecs at the time of the conquest. Population, 1920, 31,247.

TOMAHAWK (tŏm'ȧ-hąk), the name of a war club used by the Indians in North America, later extended to include the war hatchet. The Indians made these hatchets of stone, usually granite. They cut a depression or furrow on opposite sides, so as to permit fastening a wooden handle by means of sinews or cords of skin. Later, hatchets of steel, furnished by European traders, took the place of the primitive kind. Much skill was developed in the use of the tomahawk, which was either used in a hand-to-hand combat or thrown with great force, when it was directed so the edge would strike first. To bury the hatchet signifies peace, while to dig up the hatchet is equivalent to a declaration of war.

TOMATO (tō-mā'tō), a plant of the nightshade family, which is extensively cultivated for its edible fruit. The tomato is native to

CULTIVATED TOMATO.

South America, whence it was introduced to the United States about 1830. It is a weak-stemmed trailing annual with jagged leaves, resembling the potato in its general appearance, and bears small flowers of a yellowish color. Many species have been evolved by propagation, bearing fruit ranging in size from a small plum to that of a large apple. The fruit is shaped more or less irregularly and is mostly of a red or yellow color. The seed is sown early in March and the young plants are transplanted to the garden as soon as all danger of frost is past, though this mode of treatment applies only in the Temperate zones. It is best to fasten the plants to a wall or other support where the sun may strike them with full effect, thus keeping the vines off the ground and hastening the ripening of the fruit. Tomatoes do not ripen much farther

north than 45°. The fruit is used for a condiment before fully ripened, and the ripened product is eaten raw. However, its greatest value is in preparing sauces, preserves, and pies. Large quantities of tomatoes are canned and sold in the market at all seasons of the year. Maryland, New Jersey, Indiana, and California take the lead in the cultivation of this plant.

TOMB, a structure for the burial of the dead, usually of stone, either within the ground or upon the surface. In ancient times it was customary to construct tombs of great strength, and the dead were embalmed with the view of preserving the bodies until they would take on immortality. In many countries, as in Egypt, the highest efforts of art were bestowed upon the burial places. Remains of these are very extensive, some in a high state of preservation, and innumerable mummies are preserved that date back to the early kings of Egypt. The catacombs of Rome are among the remarkable tombs of antiquity, and similiar burial places are preserved in various parts of Greece. Such burial places are numerous in Asia, especially in regions that were occupied by the ancient Greeks. The most famous is the mausoleum of King Mausolus of Caria, whence the name mausoleum originated, and this tomb is counted one of the seven wonders of the ancient world.

During the Middle Ages it became customary to construct tombs, or sarcophagi, in the churches. Originally they were set on the floor of the church, but later tombs were constructed under the floor and stones with inscriptions were placed so as to make a part of the floor. This style continued in vogue until modern times, and many examples of it may be seen in America, as in the Saint Paul's Church of New York City and other ecclesiastical edifices dating from the pre-Revolutionary period. Another modern form of tombs is that used in constructing vaults entirely within the ground, in the form of a cistern, suitable for depositing a large number of corpses, as the burial place of Benjamin Franklin in Philadelphia. The largest number of tombs found in America at present is at New Orleans, where the ground is too damp for interment below the surface. These tombs are constructed of solid stone, above the surface of the ground, chiefly of granite. They resemble in appearance small buildings and are constructed on a regular plan so as to permit reaching them by walks and drives. The tombs of New Orleans number several thousand and many of them are very beautiful.

TOMBIGBEE (tŏm-bĭg′bē), a river of the United States, which rises in the northeastern part of Mississippi, enters Alabama a short distance below Columbus, and joins the Alabama River 45 miles above Mobile to form the Mobile River. The general course is toward the southeast, and the total length is 452 miles. It is navigable to Columbus, Miss., a distance of 410 miles from Mobile Bay. The Black Warrior River is its chief tributary, which joins it at Demopolis, Ala.

TOMPKINS (tŏmp′kĭnz), **Daniel D.,** statesman, born at Scardale, N. Y., June 21, 1774; died June 11, 1825. He studied at Columbia College, was admitted to the bar, and in 1804 became a member of Congress. Soon after he was appointed judge of the New York supreme court and was elected Governor of the State in 1807. He supported the policies of Thomas Jefferson and opposed chartering the Bank of America in New York City. During the War of 1812 he rendered valued services to the Americans and in 1817, as Governor of New York, he recommended the abolition of slavery in that State. He was elected Vice President with Monroe in 1816, was reëlected in 1820, and subsequently served as chancellor of the University of New York.

TOMSK (tômsk), a city of Siberia, on the Tom River, a tributary of the Obi, about midway between the boundary of Europe and Lake Baikal. It is reached by the Trans-Siberian Railway, with which it is connected by a short branch line. The manufactures include soap, spirituous liquors, leather, hardware, lumber products, clothing, and implements. It has a very extensive trade with the Mongols and Kalmucks in the region lying south of Siberia, and contains a number of excellent government buildings, numerous churches, and an imperial university. The government of Tomsk, of which it is the capital, is one of the richest in Siberia. It has extensive mines of gold, silver, copper, zinc, lead, iron, and coal. It produces large quantities of wheat and other cereals and has extensive interests in rearing cattle, horses, and sheep. Tomsk was founded in 1610, but its greater prosperity dates from the construction of the railroad line connecting it with European trade centers. Population, 1922, 65,534.

TOM-TOM (tŏm′tŏm), or **Tam-Tam,** a musical instrument used by many Asiatics, chiefly in China and India. It is in the form of a metal disk, is concave in the central part, and is suspended from the neck by a loop. The player strikes the instrument with the fingers or a set of sticks that have a soft knob. The tom-tom is used to produce tones for dancers and in some cases to attract attention.

TON, a measure of weight used in Great Britain and the United States. It is equivalent to 20 standard hundredweights of 112 pounds each, or 2,240 pounds. This is the long ton, while the short ton contains 2,000 pounds. The hundredweight in the latter contains 100 pounds. Unless otherwise specified, it is understood that a ton consists of 2,240 pounds avoirdupois. The liquid ton, or tun, contains 252 gallons.

TONAWANDA (tŏn-à-wŏn′dà), a city of New York, in Erie County, on the Niagara River and the Erie Canal, ten miles north of Buffalo. It is on the Lehigh Valley, the New York Central, the Erie, and other railroads. Among

the features are the public library, the high school, the armory, the public park, and electric railway connections with Buffalo and Niagara Falls. The chief manufactures are flour, ironware, lumber products, and machinery. Tonawanda is now practically united with North Tonawanda, which is situated in Niagara County. The census of 1920 accords the former a population of 10,068 and the latter, 15,482; total 25,550. Tonawanda in 1925 had a population of 11,292.

TONE, in music, the sound produced by a sonorous body, as a string or a piece of metal. The term is specially applied to the larger intervals of the diatonic scale, while the smaller intervals are known as *semitones.* Tones are classified according to the qualities and relations of the sound, depending upon their place on the scale, as high or low tones, or as fine, clear, or feeble tones. Some writers use the words *step* and *halfstep* instead of *whole tone* and *semitone.*

TONGA ISLANDS (tŏ'ngȧ). See **Friendly Islands.**

TONGKING, or **Tonquin,** a French protectorate in the southeastern part of Indo-China. It is bounded on the north by China, east by China and the Gulf of Tongking, south by Annam and Siam, and west by Laos. The area is about 40,500 square miles. It is traversed by the Red, or Song-Koi River, which has an extensive delta as it enters the Gulf of Tongking. The eastern part is level and alluvial and the northern section is a plateau and is heavily timbered. Coal, copper, gold, and iron are mined. Among the chief crops are corn, opium, coffee, tobacco, rice, and sugar cane. Large interests are vested in growing live stock, especially cattle and buffaloes. A number of railways are in operation and the harbors are well improved for shipping. Hanoi and Haiphong are the chief commercial and manufacturing centers. Tongking remained an independent state until 1802, when it was annexed to Annam. In 1885 it was made a possession of France, to which country it belongs at present. The inhabitants are mostly Annamese and reside principally in the valley of the Red River. Population, 1922, 7,125,000.

TONGUE (tŭng), an organ situated in the mouth of nearly all vertebrates, though most completely developed in mammals. In man the tongue is a highly muscular organ, covered with mucous membrane, and the sides, upper surface, and front part are free to move under nerve stimuli. Hence, it is highly useful in mastication, deglutition, and the articulation of speech. The mucous membrane is covered by peculiarly developed papillae, or eminences, which constitute the chief seat of the sense of taste. It has three kinds of papillae—the filiform, the fungiform, and the circumvallate. The *conical filiform papillae* are minute structures on the upper surface; the *fungiform papillae* are somewhat larger than the filiform and are scattered irregularly; and the *circumvallate papillae* are near the posterior part, forming eight to ten of the largest structures of this kind, and are somewhat V-shaped. A slight furrow, called the *raphe,* characterizes the tongue along the middle, extending nearly its whole length, and often terminates by a depression behind called the *foramen caecum,* into which mucous glands open.

A restraining band or fold, called the *frenum,* abridges the backward movement of the tongue-tip. A person in whom it extends quite to the tip is prevented more or less from the free use of the tongue in chewing and articulating speech. This occurs most frequently in children, who are then said to be *tongue-tied.* The tongue in the lower mammals is essentially the same as that in man. As a rule birds have a small, cartilaginous tongue, which serves in most species rather for prehension than taste, though some birds have a soft and fleshy tongue, as in the parrots, thus giving them ability to imitate the human voice. The horny tongue found in some birds is a prolongation of the hyoid bone. Most lizards have a long, protrusile tongue, usually forked, though in some species it is fleshy and not protrusile. In fishes the tongue is rather an organ of prehension than of taste, and in some species is covered with toothlike projections. The name tongue is applied loosely to very different structures in invertebrate animals. See **Taste.**

TONIC (tŏn'ĭk), a medicine used for increasing permanently the strength of organic action. It is intended to induce greater energy in all parts of the body, without necessarily causing any apparent or unusual increase in the healthy action of particular organs. Tonics are usually divided into two classes, those that influence the stomach so as to increase its digestive functions and those that pass directly into the blood and act as stimuli. Among the former are the bitters, such as gentian, boneset, quassia, and chamomile. Various preparations of salts and iron have a favorable influence upon digestion and exert an influence upon the blood. Bathing, friction, and open air exercises are tonics, although they are nonmedical in character.

TONKA BEAN (tŏn'kȧ bēn), or **Tonqua Bean,** a tree native to Guiana. It has pinnated leaves and purplish flowers. It bears a fibrous drupe containing a single seed. The seed has a strong, agreeable odor, and is used in the adulteration of vanilla, for perfuming snuff, and for flavoring smoking tobacco. A number of drupes are put into chests to communicate a pleasant odor to clothes and preserve them from insects. The wood of the tonka bean is hard, heavy, and close-grained and is valued in making cabinetwork. The eboe tree belongs to the same class of plants. Although the fruit has no odor, the wood is valuable, being hard and durable.

TONNAGE (tŭn'nȧj), the unit on which the assessment of dues and charges on shipping is based. The carrying capacity, or weight ex-

pressed in tons, is termed the tonnage of a ship. For each 100 cubic feet of internal measurement, it is reckoned that a vessel may carry a ton. This unit is sometimes used in buying and selling vessels. *Gross tonnage* is the entire space within the ship, while *net tonnage* is the actual space that may be used in carrying cargo or passengers. The term *displacement tonnage* signifies the weight of the contents and of the ship, when immersed to a fixed point, and *dead-weight tonnage* is the actual capacity that the vessel can safely carry.

TONSILS (tŏn'sĭlz), the name of two ovoid bodies situated in the throat, one on each side, between the pillars of the fauces. They are almond-shaped, with the larger end directed upward, but vary in size in different individuals. The tonsils are classed with the ductless glands, but possess minute mucus follicles that give out a secretion which aids in the passage of the food. They are sometimes affected by an acute or chronic inflammation known as *tonsilitis,* which may be due to the presence of an infectious microörganism that may gain access through the mouth or nasal passages. Other causes are specific diseases, as scarlatina and smallpox. Severe attacks of tonsilitis may completely block the throat, or develop into *quinsy.* The tonsils are sometimes enlarged by a cold or sore throat. They may be removed without danger, and such an operation is sometimes necessary when they have become enlarged or suppuration has set in.

TONSURE (tŏn'shur), the practice of shaving a portion of the hair from the head of a priest, as a mark of distinction between the clergy and the laity. It was not in vogue prior to the 5th century, but at that time the monks began to clip the hair in small places or to shave the entire head. This was done partly to show their contempt of the world. In the 6th century the clergy began to practice tonsuring. In 721 it was made obligatory on all priests by Pope Gregory II. to use the so-called *tonsure of Peter,* which consists of shaving the entire head and leaving a circular crown of hair. The practice of shaving the front part of the head from ear to ear, known as the *tonsure of James,* was practiced in Ireland for many years. Priests, bishops, and cardinals of the Roman and Greek Catholic churches still practice this religious observance more or less extensively.

TONTY (tŏn'tē), **Henry,** explorer, born at Gaeta, Italy, about 1650; died in 1704. He entered the military service of France at an early age and accompanied La Salle to Quebec in 1678. Soon after he built a vessel and explored the eastern shore of Lake Michigan, the Illinois River, and Green Bay. In 1680 he built a fort near Peoria, Ill., and twice descended the Mississippi. He resided among the Illinois Indians until 1702, when he joined Iberville in Louisiana. His death occurred at Fort Saint Louis, now Mobile.

TOOMBS (tōōmz), **Robert,** statesman, born in Wilkes County, Georgia, July 2, 1810; died in Washington, Ga., Dec. 15, 1885. After graduating from Union College, New York, in 1828, he studied law at the University of Georgia and entered upon a successful law practice. He served against the Creek Indians, was elected to the State Legislature in 1837, and served in the House of Representatives as a Whig from 1845 to 1853. While in Congress he favored the compromise measures of 1850. From 1853 to 1861 he was a member of the United States Senate, favoring a disunion of the nation, and was formally expelled from the Senate in March, 1861. He served as a member of the Confederate Congress and was a prominent candidate for the Presidency of the Confederate States. Subsequently he became Secretary of State, but resigned to accept the appointment of brigadier general in the Confederate army, serving with distinction in several important engagements. He made an extended tour of Europe shortly after the war, and, on returning to America, refused to take the oath of allegiance to the United States government. However, he served as a member of the State constitutional convention. Toombs was noted as an able speaker and writer.

TOP, a toy used extensively by children. It is constructed in the form of a pear, either of wood or metal, and is made to spin on its point by drawing off a string wound round its stem or surface. A well-made top will spin on a smooth surface for some time and the motion may be continued by the use of a whip. Metal tops are hollow and have openings at the side, causing them to whistle when whirling at a high speed. The blending of colors can be illustrated by whirling a top whose upper part is painted differently, which, when in motion, shows the effect of mixing different colored pigments.

TOPAZ (tō'păz), a mineral which has a high rank among the gems. It has a vitreous luster and is either transparent or translucent. The color ranges usually from white to yellow, but there are sometimes light shades of green, blue or red. Pure topaz has a specific gravity of 3.498, and its hardness is greater than that of quartz. It is composed of silicate of aluminum, with a little oxide of iron, and a quantity of fluoric acid. Topaz is found in many parts of the world, generally in primitive rocks. Fine specimens are obtained in Brazil, Ceylon, Siberia, Scotland, Germany, and at Cornwall, England. Brazilian topaz is regarded the most valuable and, when cut in facets, it closely approaches the brilliancy and luster of the diamond. False topaz is a variety of yellow quartz.

TOPEKA (tō-pē'kà), the capital of Kansas, county seat of Shawnee County, 65 miles west of Kansas City, on the Kansas River. It is on the Union Pacific, the Missouri Pacific, the Chi-

cago, Rock Island and Pacific, and the Atchison, Topeka and Santa Fé railroads. The site is a rolling tract of land, elevated about 800 feet, and the river is crossed by a number of bridges. Many of the streets are paved substantially with brick and asphalt and avenues of trees make the residential part attractive. An extensive system of electric railways provides communication with all parts of the city and many points within the State. The streets are well lighted with gas and electricity and systems of waterworks and sewerage are maintained.

The State capitol, located in the heart of the city, is the most notable building. Other public edifices include the county courthouse, the public library, the post office, the city hall, and the auditorium. It is the seat of the Washburn College, the State Hospital for the Insane, the College of the Sisters of Bethany, the State Industrial School for Boys, the Santa Fé Railway Hospital, the State Vocational College, and a number of other institutions. The public library has about 30,000 volumes of well-selected books. The public schools are well graded and organized and the system culminates in a high school with advanced courses.

Topeka is surrounded by a fertile farming country, hence is important as a market for grain, live stock, and fruits. It has the extensive shops of the Santa Fé Railroad, flouring mills, steel and iron works, and numerous wholesale and jobbing houses. The general manufactures include machinery, clothing, earthenware, cured and packed meat, starch, and cigars. Topeka was platted in 1854 and became the center of antislavery men in the contest following the passage of the Kansas-Nebraska Bill. The so-called *Topeka Constitution* was adopted by an antislavery convention in 1856. It was chartered as a city the following year and in 1861 became the capital of the State. Population, 1905, 37,641; in 1925, 55,411.

TOPLADY, Augustus Montague, hymn writer, born in Farnham, England, Nov. 4, 1740; died Aug. 11, 1778. After studying at Westminster School, he pursued a course at Dublin, Trinity College, and soon after began successful ministerial work. He held important charges in Devonshire and London, and became noted as a writer of books on religious subjects and of numerous church hymns. As a composer of hymns he has been surpassed by few writers, many of his songs being still in extensive use. The most noted written by him is "Rock of Ages, Cleft for Me," which is esteemed by some the finest in the English language. He edited the *Gospel Magazine* for several years.

TORNADO (tôr-nā′dō). See **Storms.**

TORONTO (tō-rŏn′tō), the second city in Canada, capital of the Province of Ontario, 330 miles southwest of Montreal. It occupies a fine site on the northwestern shore of Lake Ontario, on an inlet called the Bay of Toronto, near the Don River. An area of about 40 square miles is included in the city. The water frontage is about ten miles and the city extends inland over five miles. The harbor is one mile wide and three miles long. It is protected by a crescent formed island that serves as a natural breakwater. Ships of the largest capacity are accommodated in the harbor, from

which steamers sail to the leading ports on the Great Lakes. Railroad transportation is facilitated by the main lines and numerous branches of the Canadian National and the Canadian Pacific railways. An extensive system of electric street railways has lines to all parts of the city, with which are connected interurban railways that reach many towns and places of interest.

Description. The streets of Toronto are broad and regularly platted, crossing each other at right angles. Fine avenues of trees shade the residential sections, in which the lawns and parkings are well maintained. Queen's, or University, Park, near the western part, is a beautiful section of the city. It occupies a rolling tract sufficiently elevated above the lake to afford an outlook over the harbor, and within it is the monument erected to the memory of those who fell at Ridgeway in 1866. Other public grounds include Riverdale Park, Island Park, and the exhibition grounds. The last named tract is the seat of the annual fairs of the Industrial Association. All parts of the city are well drained. The public utilities include gas and electric lighting, waterworks, and sewerage. The pavements are constructed largely of stone, asphalt, and macadam.

Buildings. The Parliament buildings, situated in Queen's Park, are of brown stone in the Romanesque style. Other buildings of note include the customhouse, the Lieut. Governor's residence, the post office, the city hall, the Foresters' Temple, many fine bank buildings, the Union Station, the public library, and the King Edward and Queen's hotels. Among the institutions are the Victoria University, the Trinity College, the University of Toronto, the Knox College, the Upper Canada College, the Wycliffe College, the Saint Michael's College, the College of Technology, and the Government School of Practical

UNIVERSITY COLLEGE, ON THE CAMPUS OF TORONTO UNIVERSITY

The University of Toronto, which includes a number of affiliated schools, is one of the greater educational institutions of Canada. To the west of Queen's Park, in Toronto, is the campus of the University, among whose buildings the most striking in appearance is that of University College, built in the Norman style of architecture, with massive proportions whose effect is heightened by the presence of a huge central tower. The view from the tower embraces th e whole city and its environs

(Art. Toronto)

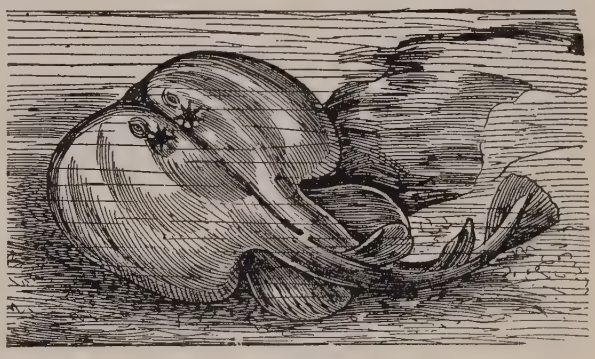
Sciences. It has numerous hospitals, asylums, and scientific and educational associations. The leading ecclesiastical buildings include the Saint James's Cathedral, the Saint Michael's Cathedral, the Jarvis Street Baptist Church, the Metropolitan United Church, the Timothy Eaton Memorial Church, the Church of the Ascension, and the Saint James's and Saint Andrew's United Church. The public library has over 450,000 volumes and branches are maintained for different parts of the city. Sunnyside Beach, which stretches along the lake shore about two miles, is famous as a recreational area, and is connected by the Boulevard with the Exposition Grounds.

INDUSTRIES. Toronto is important as a jobbing and wholesaling center. It has a large lake and railway trade in supplying markets in different parts of the Dominion. The manufacturing enterprises include shipyards, flour and grist mills, steel and iron foundries, railway shops, lumber yards, and brick yards. Among the general manufactures are clothing, boots and shoes, furniture, carpets, pianos, hardware, cigars and tobacco, bicycles, and spirituous liquors. Electric power is supplied from Niagara Falls.

HISTORY. Toronto was founded in 1794, when it was called York, and until 1841 served as the capital of Upper Canada. It became the capital of Ontario in 1867. The American army captured the city in 1813. Its greater prosperity dates from 1834, when the name was changed to Toronto and a charter of incorporation was granted it by the provincial legislature. Montreal is the only Canadian city that is larger than Toronto. Population, 1901, 208,040; in 1911, 376,240; in 1921, 521,893.

TORONTO, University of, an educational institution at Toronto, Ontario, founded as King's College in 1827. It was formally opened for instruction in 1841 and the departments of law, medicine, arts, and divinity were established the following year. It received its present name in 1849 and since has undergone reorganizations that have contributed to make it one of the leading educational centers in America. In 1853 the functions of the institution were divided into the corporations of the University of Toronto and the University College. The former has faculties in law, education, arts, medicine, applied sciences, and engineering. Courses are maintained in music, dentistry, agriculture, pharmacy, pedagogy, and domestic economy. With it are affiliated a number of professional institutions, and several colleges and universities are federated as a part of the university system. Both men and women are admitted. It has a library of 200,000 volumes and property valued at $25,000,000. The enrollment averages about 5,300 students.

TORPEDO (tôr-pē'dō), a class of fishes allied to the rays and skates, having an electrical apparatus with which they stun or kill their prey and defend themselves against enemies. Six species are common in the Atlantic and Indian oceans. Three of these are native to the Mediterranean, but there are many allied species often spoken of as belonging to the same class. They vary in size. The larger specimens are about four feet long and two feet wide at the head, and weigh 50 to 75 pounds. On each side of the head is a mass composed of plates and prisms, each forming a kidney-shaped enlargement, and within them are the electrical organs. These organs, frequently including many thousand plates and prisms, convert nervous energy into electricity. To complete the circuit the animal or object aimed at must come in contact with two distinct points, either directly or through the medium of some conductor. Full-grown torpedoes are able to inflict a severe shock, the larger and healthy specimens being able to stun a man. The American



TORPEDO.

species are dark brown above and white beneath. The larger specimens have a length of nearly five feet. They have from 250,000 to 300,000 plates in each battery.

TORPEDO, a powerful military device, containing an explosive commonly designed to be fired by concussion. Two distinct forms of the torpedo are in general use. These are in the form of a cigar-shaped boat, which is projected and carries a powerful charge under water against a hostile vessel, and a submarine mine placed stationary in the water and intended for the destruction of vessels of an enemy. Torpedoes of a stationary nature are usually called *submarine mines* and others used for offensive operation are known as *locomotive torpedoes.* Three general classes of submarine mines are constructed. They include those fired from the shore by means of an electric current, when the enemy is observed within the area of the mine; those connected with the shore by an electric wire and fired when struck by a ship of the enemy; and those fired by some contrivance within themselves when struck by a vessel. Mines are placed in position in channels or near

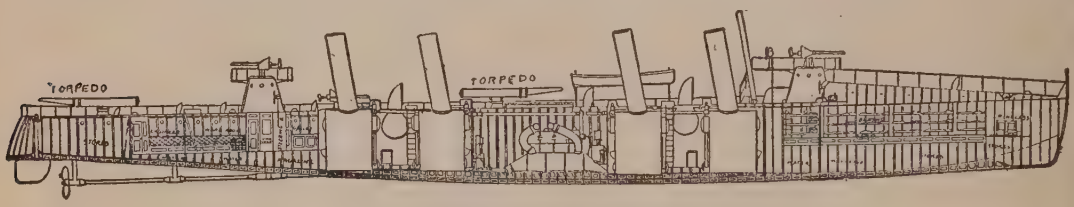
coasts to supply protection against the approach of vessels. They consist of a strong metallic case heavily charged with gun cotton or some equally effective explosive. Efforts to use torpedoes in naval warfare were first made in the latter part of the 17th century, but no material progress resulted until the middle of the 18th century. However, the first successful application of them was made in the Civil War of the United States, within the period from 1861 to 1865.

Many ingenious and improved forms of the locomotive torpedo are now in successful use. The Sims-Edison is a common form. It carries its own motor, but is controlled and receives its motive power from the shore through a controlling cable. The torpedo is mounted by a long boat-shaped float, usually fourteen to eighteen feet long and fourteen to eighteen inches in diameter, and is prevented from sinking by buoyant ballasts. In the front end is the dynamite or gun cotton, which explodes when coming in contact with a vessel. An electric motor in the center supplies the power to drive the screw propeller at the stern, thus causing it to move forward in the direction desired by the person operating the controlling cable on the shore, and it is set off either by concussion or by an electric fuse. The Howell torpedo is discharged by powder from a firing tube, instead of being carried by a motor. The Patrick torpedo is propelled by carbonic acid and is one of the heaviest, weighing about 7,250 pounds. It is eighteen inches in diameter and forty feet in length. The Hall torpedo has a flask eight feet in length filled with compressed air, by which it is propelled instead of by electricity. Other modern implements of this kind include the Harvey, the Whitehead, and the Brennan torpedoes.

Most torpedoes have a balance rudder to regulate their depth below the surface, thus enabling them to be propelled in the water at any depth desired, and consequently may be fired at any distance above or below the armor of ironclad vessels. The implements of war are carried on torpedo boats (q. v.), which are especially fitted to launch torpedoes when the ships of the enemy are some distance from the land. As a protection against torpedoes, ships sometimes suspend nets made of steel rings from spars, but they have not proved effective in active service.

TORPEDO BOAT, the name of a vessel used in modern warfare, fitted to use the torpedo as a weapon with which to attack the enemy. Vessels of this class are of high speed and are fitted with apparatus to launch torpedoes with facility. In construction they are long, slender, and low in the water. They carry one or two torpedoes, which are on the deck and in such a position that they can be turned readily in any direction. Larger vessels carry the torpedoes near the side, while the smaller ones have them on the fore-and-aft midship line. At the time of battle the torpedo boat is employed to approach the ships of the enemy secretly, usually under cover of night or in a storm, and the torpedoes are thrown against the vessels. A brilliant search light is used to locate the opposing vessels, and as soon as the torpedoes are discharged the torpedo boat hastens to escape.

Four distinct classes of these vessels are in use, though they differ widely in construction. These include seagoing boats, harbor boats, torpedo boat destroyers, and portable boats, the last mentioned being carried by men of war. A



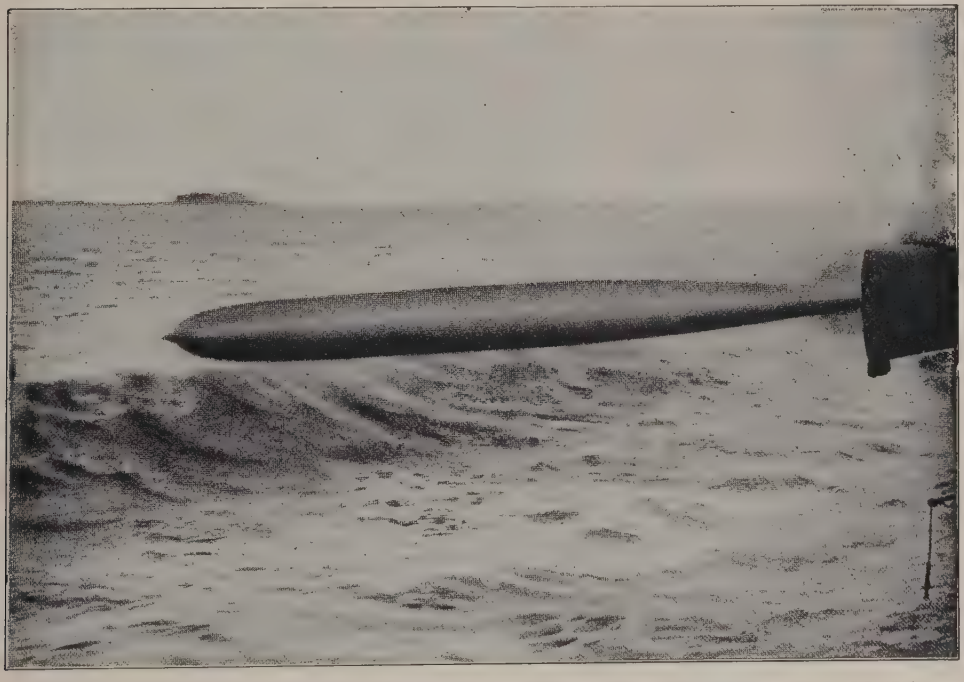
VERTICAL SECTION OF A TORPEDO BOAT.

torpedo boat destroyer is a torpedo boat of large size and high speed and is employed to combat against the approach of the enemy's torpedo boats as well as to destroy them. The newer style of vessels of this class is submarine, that is, it is capable of sailing under water. Two classes of submarine torpedo boats are in use, the submerged and the submergible. The former moves in the water with a small part of the hull exposed, while the latter, as the name indicates, is so constructed that it may be entirely submerged.

The best test of the torpedo boat in modern warfare was made during the Great European War. It proved that the most serviceable torpedo boat destroyers have a length of 300 feet, a breadth of about 30 feet, a draft between nine and ten feet, and a displacement of 1,000 to 1,200 tons. These vessels were used successfully for scouting work, in fact they took the place of ordinary cruisers with 5,000 tons displacement. Torpedoes were thrown so successfully against the most powerful ships, including both cruisers and dreadnaughts, that many large vessels were sunk or driven off the sea.

TORQUEMADA (tôr-kā-mä'thä), **Thomas de,** inquisitor general, born in Torquemada, Spain, in 1420; died at Avila, Sept. 16, 1498.

(Art. Torpedo)
THE BRITISH TORPEDO BOAT *ALBATROSS*, SHOWING THE VESSEL IN MOTION AT THE RATE OF FORTY MILES AN HOUR.



SNAP SHOT OF A WHITEHEAD TORPEDO AS IT IS FIRED WHILE THE TORPEDO-BOAT DESTROYER IS MOVING AT FULL SPEED.

He first served as prior to the Dominican monastery at Segovia, and in 1483 was made inquisitor general for Spain by Ferdinand and Isabella. This appointment was sanctioned by Pope Alexander VI., though the latter subsequently appointed a commission to limit his power in bringing people to the Inquisition. Torquemada established several tribunals, obtained the expulsion of the Moors and Jews from Spain, and promulgated a code of civil laws. He was instrumental in giving the Inquisition thorough organization in Spain.

TORRES STRAIT (tŏr'rĕz), a channel separating New Guinea from Australia. It was so named from Torres, who discovered it in 1606. It is eighty miles wide and is difficult to navigate on account of numerous reefs and shoals. Cape York, the northernmost point of Australia, projects into it.

TORREY (tŏr'rĭ), **John,** botanist, born in New York City, Aug. 15, 1796; died March 10, 1873. He studied in New York and Boston, entered a medical school in the former city, and in 1818 began the practice of medicine. Subsequently he became interested in botany, and in 1824 published an extensive work on the plants of the Northern States. He was made professor of chemistry and geology at the West Point Military Academy in the same year, and in 1827 became professor in the New York College of Physicians. A few years later he made collections of plants in Colorado and in 1836 became botanist of the State of New York. Torrey possessed a fine botanical library, which he presented to Columbia College, New York. His writings include "Flora of the State of New York," "Catalogue of Plants Growing Within Thirty Miles of New York," "Flora of the Northern and Middle States," and "Flora of North America." In publishing the last mentioned work he was assisted by his pupil, Asa Gray, who wrote a sketch of his life. Torrey contributed many articles to the *American Journal of Science.*

TORRICELLI (tŏr-rê-chĕl'lê), **Evangelista,** mathematician and physicist, born at Faenza, Italy, Oct. 15, 1608; died Oct. 25, 1647. Being left fatherless at an early age, he was trained under the direction of the Jesuits, and in 1627 began the study of science under Benedetto Castelli at Rome. He went to Florence in 1641, where he was associated with Galileo for several months, and subsequently became professor of mathematics in the Florence Academy. His name is associated with the history of science mainly because he discovered the law on which the barometer depends. He wrote several treatises on mathematics and geometry, the most important being "Opera Geometrica."

TORRINGTON (tŏr'rĭng-tŭn), a borough of Connecticut, in Litchfield County, on the Naugatuck River, 27 miles northwest of Hartford. It is on the New York, New Haven and Hartford Railroad and has communication by electric railways. The features include the public library, the municipal building, the high school, the public park, and the Y. M. C. A. building. Among the manufactures are hardware, woolen goods, hosiery, radiators, needles, plaited goods, nails, and machinery. The place was first incorporated in 1740 and became a borough in 1887. It is the birthplace of John Brown, the abolitionist. Population, 1920, 20,623.

TORSION BALANCE (tôr'shŭn băl'ans), an apparatus used to measure delicate attractions and repulsions. The essential part consists of a metal wire, or a silk thread, to which a needle is attached, and the apparatus is suspended from a fixed point. The attraction or repulsion is measured by the resistance offered to it by the torsion of the wire, that is, by its being twisted.

TORT, in law, a civil wrong or injury, in contradistinction from a crime against the public or state. Tort may be committed where a contract or other agreements exist, but it is not necessary that a claim for damages be based upon a contract, since torts are injuries or infringements of the civil rights that belong to individuals. However, an offense may be both a tort and a crime, as in the case of maintaining a nuisance or committing the offense of assault and battery. In either of these cases the injured party may recover damages and the offender may be punished under the criminal law.

TORTOISE (tôr'tĭs), a class of reptiles which belong to the same order as the turtles, but differing from them mainly in that they frequent the land, marshes, and inland waters, while the turtles live principally in the sea. The skeleton of both classes is mostly a horny inclosure of the body, which forms an outside bony case to protect the fleshy part and the true skeleton, and is covered by a skin or by horny epidermic plates. The upper part of the shell is called the *carapace* and is formed of bony plates fitting into or overlapping each other, while the lower part, or *plastron,* takes the place of the breastbone in other animals. In most species the latter consists of one piece. Inside the body proper is the true skeleton, the bones of which serve as levers for the animal to propel itself. When walking or swimming, the head, legs, and tail are protruded from the shell, but in a state of rest or during a time of danger they are carefully drawn into the shell for protection. Some species have plates that may be closed down to protect the fleshy parts and the head when drawn into the shell. All are oviparous and lay 75 to 125 eggs at a time. The eggs are deposited in a sandy place near a marsh or body of water, where they are hatched by the heat of the sun.

The species are very numerous and the sizes range from small forms about the size of a hen's egg to the gigantic land tortoise of the tropics, which attains an age of 100 years and

a weight of 875 pounds. Land tortoises are slow and awkward in their movements, but those living in water move with remarkable rapidity, either to seize their prey or to escape danger. The food of a few terrapins, land tortoises, and some marine turtles consists of herbs, but many species are carnivorous, preying on frogs, fishes, and small aquatic animals. The *salt-marsh terrapin,* or *diamond back,* is native to the Atlantic coast of North America and is famous for its delicate flesh. It is caught in great numbers in summer and kept in pens for sale in winter, the females with eggs being considered the best. The *green turtle* is caught in large quantities in the West Indies and on the coast of the Gulf of Mexico. It is considered an important article of food.

Species of tortoise known as the *loggerhead turtles* are very common along the Atlantic coast of North and South America and Europe. They are also abundant in the Mediterranean. The flesh of the adult is rarely eaten, but that of the young is considered quite nutritious. The *hawksbill* is native to the warmer parts of America and is not eaten to any considerable extent, but it is caught in large numbers for its shell, the horny plates of which form the *tortoise shell* sold in the market. It is used for ornamental work. Tortoises are very numerous in all parts of the world, but they are not so large as the turtles. The *snapping turtle* found from Florida to New Brunswick is one of the largest, some specimens being four feet in length. Other species common to North America include the *mud tortoise, gopher tortoise, spotted tortoise, soft-shelled tortoise,* and *box tortoise.* Animals of this genus found in the Temperate zones hibernate. All reside throughout the year in the same locality, except the marine turtles, which migrate periodically to breeding stations. Many fossil turtles have been described, some of which attained an immense size.

GREEN TURTLE. TORTOISE.

TORTOISE SHELL, the name commonly applied to the scales that cover the shell of the hawksbill, a large turtle found in the tropical seas. These scales are remarkable for their plastic quality and under the influence of heat may be formed into various shapes. It is possible to weld pieces of the shells under pressure when heated. Artisans use the chips and filings after molding and shaping them when heated. Tortoise shell is used in the manufacture of toilet articles, such as combs and handkerchief boxes. The Romans used this material in veneering furniture, and products of this kind are still made by the Japanese. Horn and celluloid are used extensively as imitation of tortoise shell.

TORTUGAS. See **Dry Tortugas.**

TORTURE (tôr'tûr), a form of punishment employed to extract evidence from unwilling witnesses, to compel confession by inflicting pain, or to increase the punishment after judicial conviction. The Greeks used torture as a judicial procedure for the punishment of slaves, which was the case in Rome until in the later period of its history, when it was extended to various cases of a criminal nature. Torture was adopted as a form of punishment under ecclesiastical sanction about the middle of the 13th century, reaching its most hideous form in the practices of the Inquisition. The modes of punishment were very numerous, including the rack, an apparatus to stretch the body; the boot, containing pegs or wedges of iron; the thumbscrew; the scourge; and confinement in dungeons. Other forms were to pour melted lead in the ears, to cut off the limbs, to put out the eyes, to suspend the body over a slow-burning fire, to crush the body, and to crucify. In the last mentioned form the body was frequently covered with honey that insects might torment the helpless and unfortunate victim. Torture was employed in England until the reign of Charles I., but it continued in use in Scotland until near the beginning of the 18th century. Prussia and Austria abolished it about the middle of the 18th century, France in 1789, and Russia in 1801. A few cases of torture are on record in America, especially the case of Giles Corey of Salem, who, in 1692, refused to plead when arraigned for witchcraft. Cruel and unusual punishments are especially prohibited by the Constitution of the United States and by those of most states.

TORY (tō'rỹ), the name of a leading political party in Great Britain. It was originally applied to the Roman Catholic outlaws who lived in the marshy district of Ireland. About 1679 it came to be used as the name of all,

irrespective of descent, who were opposed to the bill that excluded the Duke of York from succession. Those who favored the succession of the duke used the term to imply that his opponents had sympathies with the Roman Church. The name was finally adopted by the great political party that opposed the Whigs in British politics, but in 1830 this party was displaced by the Conservatives. The British loyalists during the American Revolution were called Tories.

TOTAL ABSTINENCE (tō'tạl ăb'stĭnẹns), a term commonly used to imply entire abstention from the use of alcoholic liquors, except under medical prescription. Temperance societies were first organized to limit the use of liquor to reasonable quantities, rather than to teach the duty of totally abstaining from using all forms of intoxicants. Members were pledged to observe moderation, calmness, and self-control, not only for their own good, but for the sake of their fellows. The history of the temperance movement dates from ancient times, and we learn that the Jewish Nazarites acted on total abstinence principles. Mohammedans and the higher Hindu castes nominally abstained from intoxicating liquor, this being a religious obligation placed upon them.

The first temperance society on record is that of Saint Christopher, founded in Germany in 1517, whose members were pledged to exercise moderation. An organization formed at East Hampton, Long Island, in 1651, for the purpose of limiting the sale of intoxicants, was the first to be instituted in America. In 1789 a society of farmers was formed at Litchfield, Conn., the members pledging themselves to abstain from the use of liquor in their farm work. Total abstinence was recommended by H. Humphrey in 1812 and by Lyman Beecher soon after, thus giving rise to various temperance societies. However, the American Temperance Union was not instituted on the basis of total abstinence until in 1836. It was followed by a number of similar associations, and many powerful organizations with associated societies sprang up.

Among the influential temperance societies of America are the Washingtonian Temperance Society, organized in Baltimore in 1840; the Sons of Temperance, instituted in New York City in 1843; and the Independent Order of Good Templars, founded in the State of New York in 1851. The last mentioned adopted a platform in 1859, declaring for total abstinence, no license, and absolute prohibition. It is one of the most powerful organizations in the world, having at present 85 grand lodges, and a membership of 650,000. This number includes the juvenile branch with 181,382 members. The organization is in the form of a civic order, having a ritual, signs, and passwords. The Royal Templars of Temperance, formed in 1877, is a similar organization, but in addition has a form of life insurance and benefits for those who are in need or distress.

A temperance crusade was started at Washington Court House, Ohio, in 1873. It was an organized effort against saloons and resulted in closing many places where liquors were kept for sale. In these campaigns men and women armed with weapons and hymn books either persuaded the keepers to close their places of business or forcibly destroyed their wares. The most powerful society of temperance workers ever organized is the National Woman's Christian Temperance Union. It has auxiliaries in every State and Territory of the United States and is organized locally in more than 10,000 towns in the Union. Affiliated with it are branch organizations in Canada, the Hawaiian Islands, Cuba, Great Britain, Japan, Madagascar, India, South Africa, the Philippines, France, Germany, Russia, and almost every civilized nation. This organization is a union of Christian women for the purpose of educating the young, reforming the drinking classes, stimulating public sentiment, and ultimately securing the abolition of the liquor traffic by legal enactments. The society owns the Woman's Temple, one of the finest buildings in Chicago, which is the headquarters and principal seat of influence.

The crusade against intemperance was materially stimulated in the British Isles by Theobald Mathew, who may justly be regarded the apostle of temperance in Ireland. He began work in 1838 and in less than a year secured 1,800,000 recruits to the cause. The Independent Order of Good Templars was founded in England by Joseph Malins in 1868, though similar organizations had operated some years previous. At present many allied organizations are maintained in Great Britain, including the Scottish Temperance League, the National Temperance League, and the Irish Temperance League. Cardinal Manning in 1873 began a vigorous temperance movement among the Roman Catholics. A greater interest is developing in favor of temperance in all countries under Christian influence, both along the line of moderation and total abstinence.

Prohibition of the sale and manufacture of liquor is another form of the temperance movement. Legal enactments were directed against the use of liquor as early as 1639 in the Massachusetts colony, and Connecticut and several other colonies enacted similar laws. Pennsylvania imposed a duty on imported liquors in 1756, and measures to abolish the manufacture have been introduced into the American Congress at different times. The first restrictive liquor law was passed in Maine in 1846, and in 1851 a more stringent prohibitory one, known as the *Maine Law* and drafted by Neal Dow, was enacted in its place. This law has been in effect practically ever since. Prohibition laws were enacted in New York, Vermont, Connecticut, New Hampshire, Kansas, Iowa, Rhode Island, and many other states, but they have been modified or repealed more or less at dif-

ferent times. More recently, from 1907 to 1918, prohibitory laws have been enacted in a majority of the states, in some states local option laws and in others prohibitory or "Bone Dry" laws. The Prohibition party, which placed its first candidate in the field in 1872, did not poll a heavy vote at any time, but it had a marked influence upon public policy. In 1916 the Webb-Kenyon law prohibited the transportation of liquor from a "wet" to a "dry" state. Congress, in 1917, added a prohibitory law to the Postoffice Appropriation Bill, forbidding the sending of liquor advertising by mail. Congress also, in 1917, submitted the Prohibition Amendment for ratification by the states within six years. This, the XVIII Amendment to the Constitution, was adopted in 1919, prohibiting the sale of spirituous liquors.

TOTEMISM (tō'tĕm-ĭz'm), a form of worship found in many savage communities, especially among the Indians of North America The word totem is from the Ogibway tongue and signifies a family or tribe. Various applications are made of the term totemism, but in general it may designate a clan, a religion, or a social aspect. The clan usually has a totem pole, on which are carved figures that represent the totem belonging to it. This pole, or rather the figures upon it, indicate political and social standing and at the same time are worshiped. Totem poles decorated with curious figures and colored variously are met with in many parts of Alaska and in the northern part of Canada. They vary in length from ten to fifty feet. When planted in the ground, only the portion having the figures is exposed and these are chiefly on one side. Poles of this class are made of the bodies of trees measuring from one to two feet in diameter.

TOTEM POLES.

TOUCAN (tōō'kăn), a class of climbing birds which are native to tropical America. They are noted for their immense beak, which is toothed along the margins of the mandibles. The *yellow toucan* is about eighteen inches long, the tail is short, and the bill is orange-red. The beak is about nine inches long, but is comparatively light owing to its being penetrated by numerous air cells. About fifty species have been described, but all are American birds. The

TOUCAN.

plumage of most toucans is gaudy, commonly diversified by red, blue, black, and yellow. Among familiar species are the *toco toucan,* the *aracari toucan,* and the *yellow-breasted toucan.* These birds never approach houses, but instead live in the shade of the forests, usually in pairs, though at some seasons they congregate in small parties. Their diet consists almost exclusively of fruits, but in the absence of this kind of food they feed on fish, birds, and small quadrupeds. They may be tamed and kept in confinement, but are much more beautiful in the native state. The food, after being swallowed, is brought up to undergo mastication, an operation corresponding to the chewing of the cud among ruminants.

TOUCH (tŭch), the sense of feeling, giving man cognizance of solidity, temperature, smoothness, and other palpable properties of bodies. It is frequently called the *general sense,* since its nerves are spread over the whole body and by it we become conscious of all sensory impressions which are not the objects of the four special senses of taste, sight, smell, or hearing.

The principal end organs of the nerves of touch are in the skin, called the *papillae,* which are minute conical projections covering the cutis. Each one of these papillae contains the tiny nerve twigs, which receive the impression and transmit it to the brain, where the perception is produced.

Although there are terminal organs of the sensory nerves all over the body, the sense of touch is more acute in some places than in others, owing to the presence of a greater number of papillae. The points of the fingers are more sensitive than any other part of the body, being able to convey the largest number of different impressions, but the forehead requires less pressure to receive sensations than any other portion. Keenness of touch is likewise found in the tongue and the red parts of the lips. The least acute surfaces are those of the middle arm and thigh and of the middle of the back and the neck. This may be demonstrated by placing two objects in contact with the neck, when the sensation produced is that of one object, though the two points in contact with the skin are a short distance apart. The sense of touch is capable of a wide range of cultivation. Physicians acquire by practice the so-called *tactus eruditus,* or *learned touch,* and the blind develop a delicacy of touch that almost compensates the loss of sight. This is due to the sympathy between the different organs, since, when one sense fails, the others develop to remedy the defect.

TOUCHSTONE, or **Lydian Stone,** a hard variety of jasper, so named from its use in testing the purity of metals, which is done by rubbing them across the surface. The name *Lydian stone* is applied from Lydia, in Asia Minor, where a peculiar species is found. In making the test, a series of needles, known as *touch needles,* is used. The metal to be tested is first rubbed across the surface of the stone and then a needle of the same material is drawn across the surface, the purity being judged by the nature of the streak. In testing gold, a needle of pure gold is used and the streak made by it is compared to the streak made by the metal tested.

TOULON (tōō′-lŏn), a seaport city of France, in the department of Var, 35 miles southeast of Marseilles. It occupies a sheltered site on the Mediterranean and ranks next to Brest as a naval stronghold of the republic. The city is defended by strong forts on the adjacent mountains, has well-constructed redoubts and arsenals, and contains a secure harbor. Among the principal buildings are the townhall, the military and naval schools, and a Romanesque cathedral dating from the 11th century. It has a large interior and foreign trade. The manufactures include cotton and woolen goods, silk textiles, pottery, ships, engines, and farming implements. The streets are wide and straight, crossing each other at right angles. Gas and electric lighting, rapid transit, waterworks, sewerage, and several fine parks are among the improvements. The Romans utilized the advantageous situation of Toulon in making it a trade port. It was destroyed by the Saracens in 889 and was captured by the allied army of Spain and England in 1793. Subsequently its fortifications were greatly strengthened and its harbor has been improved by the construction of moles. Population, 1921, 104,582.

TOULOUSE (tōō-lōōz′), a city of France, on the Garonne River, 140 miles southeast of Bordeaux. It is entered by a number of important railroad lines, has well-paved streets, and is improved by modern facilities. The city has gas and electric lighting, street railways, waterworks, fine public parks, and several institutions of higher learning. Among the noteworthy buildings are the Cathedral of Saint Etienne, the municipal theater, the palace of justice, the city hall, the central railroad station, the Church of Saint Sernin, the Musée, the university, and several hospitals, asylums, and professional institutions. It has a number of well-patronized associations of science, art, law, and economics. The manufactures embrace cloth, glass, paper, leather, starch, macaroni, pottery, furniture, flour, saddlery, tobacco, machinery, cutlery, wine, and musical instruments. Large quantities of agricultural, dairy, and fruit products are sold in the market. It has a vast trade in raw and manufactured silk. Toulouse was made the capital of the Visigoths in the 5th century. On April 10, 1814, it was the scene of a battle, in which the French under Soult were defeated by the allies under Wellington. Population, 1921, 149,576.

TOURCOING (tōōr-kwăn′), a city in northern France, in the department of Le Nord, seven miles northeast of Lille. It has railroad facilities and is surrounded by a fertile agricultural and fruit-growing region. Among the chief buildings are the city hall, the public library, the Gothic church, and many schools. It is important for its extensive interests in the manufacture of cotton, linen, wool, and silk textiles, this enterprise employing about 50,000 spindles. Other manufactures include carpets, woven goods, soap, sugar, furniture, dyes, and machinery. The streets are regularly platted and well improved, having pavements, rapid transit, sewerage and waterworks. Population, 1922, 81,671.

TOURGEE (tōōr-zhā′), **Albion Winegar,** journalist and author, born in Williamsfield, Ohio, May 2, 1838; died May 21, 1905. He studied at the University of Rochester, New York, from 1859 to 1861 and in the latter year enlisted as a New York volunteer in the Union army, serving at Bull Run, Perryville, and other engagements. Subsequent to the war he practiced law in Greensboro, N. C., was a member of the State constitutional conventions of 1868 and 1875, and in the meantime published

the *Union Register.* In 1868 he was chosen judge of the North Carolina superior court and was appointed pension agent in 1876. His first published work, "A Fool's Errand, by One of the Fools," appeared in 1879. It treats of his experience in connection with southern sentiment and had a remarkable sale, fully 140,000 being sold within a comparatively short time. From 1882 to 1884 he published the New York *Continent* and in 1889 became professor in the Buffalo Law School. His principal works include "Statutory Decisions of the North Carolina Reports," "Hot Ploughshares," "Figs and Thistles," "Bricks Without Straw," "Out of the Sunset Sea," "Pactolus Prime," "The Battle of the Standards," and "An Appeal to Caesar."

TOURMALINE (tōōr'mȧ-lĭn), a crystalline mineral ranked among the gems, occurring in primitive rocks, usually in gneiss, granite, and mica slate. It includes opaque, transparent, and translucent species. The principal components are silica and alumina, these forming about three-fourths of the whole, the remainder being largely lime, magnesia, fluorine, iron, manganese, potash, and other substances. The prevailing colors are red, green, blue, brown, and black, though colorless specimens are not rare. It crystallizes in prisms that are either three or six-sided and has a vitreous luster. Tourmaline is a double-refracting crystal and has the property of polarizing light. Jewelers prize the fine specimens, though they are comparatively rare. Tourmaline occurs in Siberia, Brazil, Ceylon, New Brunswick, New Hampshire, California, Vermont, and New York.

TOURNAMENT (tōōr'nȧ-mẹnt), a military sport practiced in the Middle Ages by armed knights, usually as an exercise of skill at some great event, as a royal marriage or military festival. The knights were mounted on horseback, the name tournament coming from the skill exercised in turning the horses while taking part in the contest. A single contest between two knights was called a *joust,* while the name *tournament* was applied to a number of jousts and to combats among several parties of knights. They were held by the solicitation of princes or nobles, who sent out invitations by heralds, but certain qualifications of birth were required for admission. The contests took place within an open space surrounded by a rope or railing, and around it were galleries for spectators, heralds, and the judges. Each knight carried a light armor, which was generally adorned with some device of a lady's favor. After the prizes were awarded by the judges, they were delivered to the successful knights by the queen of beauty, who received her appointment by the lady spectators.

The practice of holding tournaments reached its full perfection in France and Germany in the 9th and 10th centuries, and was introduced into England shortly after the Norman conquest. In most countries the arms employed were made especially for the purpose, the lances being without heads, while the swords were without points and had blunt edges. The ordinary weapons of warfare were used on some occasions, and it was not infrequent to arouse angry passions that resulted in severe injury or death. Henry II. of France received a fatal wound at a tournament, by which much opposition to the sport was aroused and the practice was finally abandoned with the decline of chivalry. Tournaments were given in America to a limited extent as a sport, but the practice never gained a wide foothold.

TOURNIQUET (tōōr'nĭ-kĕt), an instrument used by surgeons to check the flow of blood from wounds. It consists of a pad to compress the artery, which is held in place by a strong band, and pressure is obtained by a screw that serves to tighten the band. A simple form of the tourniquet may be made by placing a cord between the wound and the heart and applying pressure by means of a stick, which is used to twist the cord or band.

TOURS (tōōr), a city in France, capital of the department of Indre-et-Loire, 130 miles southwest of Paris. It occupies an imposing site at the junction of the Cher and Loire rivers, has numerous railroads, and is famous for its manufacture of silk. Two suspension bridges and a fine stone bridge 1,225 feet long cross the Loire. It has a beautiful Gothic cathedral, numerous other churches, a museum, and a library of 60,000 volumes. The inhabitants include many persons of wealth and leisure, who have encouraged the organization of societies devoted to art, science, agriculture, literature, and horticulture. Besides a large output of silk, it has manufactures of stained glass, boots and shoes, carpets, edged tools, paint, pottery, and wine. Tours lost many of its most skilled artisans at the revocation of the edict of Nantes and from that loss it has never recovered. The German army occupied it in the Franco-German War. Population, 1922, 67,601.

TOUSSAINT (tōō-săn'), **François Dominique,** surnamed *L'Ouverture,* distinguished military leader, born near Cape François, Hayti, May 20, 1746; died near Besançon, France, April 27, 1803. He descended from slave parents, being the second son of an African chief who had been captured and enslaved. In 1791 the colored people of Hayti organized a revolutionary movement against France and he joined the insurgents, acting for some time as physician of the forces. Subsequently he became military leader of the insurgents and as such demonstrated eminent ability in conquering the island. The English invaded Hayti in 1793, but France having declared all slaves free, he sided with the latter, and in 1797 forced the English army to surrender. He was soon after made commander in chief of Santo Domingo. His management was upright and vigorous, giving encouragement to trade, agriculture, and internal

improvements. The Spanish forces occupying the eastern part of the island were soon forced to yield their claims, thus making Toussaint the chief influence on the island, which he governed as president under France.

A constitution was adopted under his direction, which vested the government in a council of nine members, formed of one mulatto and eight white citizens. This constitution was opposed by Napoleon, who soon after issued a proclamation reëstablishing slavery. To carry out this edict he sent an army of 30,000 men and a squadron of 54 vessels under General Leclerc, the husband of Pauline, Napoleon's sister. The expedition was unsuccessful in forcibly conquering the island, but the French general secured the surrender of Toussaint on the condition that the natives would not be reënslaved and no one would be punished for past political offenses. However, the French subsequently seized and carried him to France as a prisoner, and he was committed without trial to the dungeon of the Castle of Joux, near Besançon. He died from neglect after ten months of prison life. The name of Toussaint L'Ouverture has been made famous in literature by Wordsworth and Whittier.

TOWER (tou'ẽr), a building of simple and compact form, usually cylindrical and not much higher than it is wide. The ancients constructed towers only for defense, but later this form was used in lighthouses. In the Middle Ages it became popular to ornament castles and churches with towers, and those used in ecclesiastical buildings usually served for hanging bells, though in Italy the bell towers were near but separate from the churches. Palaces and castles had towers for the purpose of watching or giving signals. Many towers are constructed by Asiatics, such as the minarets on the Mohammedan places of worship and the emblematic towers of Indian and Chinese temples.

TOWER, Charlemagne, diplomat and capitalist, born in Philadelphia, Pa., April 17, 1848. He studied at Harvard University, where he developed ability as a student and thinker, and subsequently became interested in railroading and mining. From 1882 to 1887 he was president of the Duluth and Iron Range Railway, and in the latter year removed to Philadelphia and became the leading spirit in several large corporations. President McKinley made him minister to Austria-Hungary in 1897, which position he filled until 1899, when he was made ambassador to Russia, serving until succeeded by Andrew D. White. He was appointed ambassador to Germany in 1902, serving until 1908, when he was succeeded by David J. Hill. Besides contributing to periodical literature and editing various reports, he published "Catalogue of a Collection of American Colonial Laws" and "Marquis de La Fayette in the American Revolution." He was prominent as a member of many scientific associations and received an appointment as grand officer of the Legion of Honor of France. He died Feb. 24, 1923.

TOWER OF LONDON, an ancient structure outside the eastern wall of the city of London, on the northern bank of the Thames. It was begun by Bishop Gundulf under the direction of William the Conqueror in 1078, but remained unfinished for more than thirty years, though various additions and changes have been made since at different times. The buildings occupy a space of thirteen acres, surrounded by a wall with massive towers, and are inclosed within a moat or ditch. In the central part is a massive white tower, the oldest of the structures, and surrounding it are the barracks, chapel, and several other buildings. The Chapel of Saint John is a fine specimen of Norman architecture. The Tower was used as a fortress by the first two Norman kings, and Henry I. made it a state prison. It was enlarged from time to time for prison purposes, being used largely for the confinement of political offenders, but also as a royal palace and as a fortress of defense. Many noted acts of cruelty were committed there, notably the murder of the two young sons of Edward IV., whose lives were taken for political purposes in the so-called Bloody Tower. The Tower of London is now a great military storehouse, containing arms and supplies for a large army. It is equipped with a small military garrison.

TOWNE, Charles Arnette, public man, born in Oakland County, Michigan, Nov. 21, 1858. He studied in the public schools and, after taking a course in law, was admitted to the bar. Soon after he developed a successful law practice in Duluth, Minn., and in 1894 was elected to Congress as a Republican. In 1896 he left the Republican party, owing to its position on the money question. He gave Bryan and bimetallism enthusiastic support in the ensuing campaign, delivering addresses in a number of states. In 1900 he was nominated for Vice President by the People's party, but withdrew to give his support to Bryan and Stevenson. Subsequently he removed to New York City to engage in financial enterprises.

TOWNSHEND (toun'zĕnd), **Charles,** statesman, born at Rainham, England, March 10, 1674; died June 21, 1738. He was made second viscount on the death of his father, in 1687, and became associated with the Whig party. In 1709 he was ambassador to Holland, where he signed the Barrier Treaty at The Hague. On the fall of the Whig ministry, in 1712, he returned to England, where he was censured for having signed the Barrier Treaty and was declared an enemy of the kingdom. He became Lord Lieutenant of Ireland in 1717 and for several years served as Secretary of State, from 1721 until 1730. Owing to differences with Sir Robert Walpole, his brother-in-law, he retired from public life.

TOWNSHEND, Charles, statesman, born

in England, Aug. 29, 1725; died Sept. 4, 1767. He was a grandson of the second viscount, Charles Townshend, and in 1847 entered the House of Commons. In 1754 he was made Lord of the Admiralty, but an attack upon the ministry brought about his dismissal. Pitt caused him to be appointed Treasurer of the Chamber, but he went over to the opposition and was made Secretary of War in 1761. Four years later he supported the Grenville Stamp Act and in the meantime introduced the Townshend Acts, which had an influence in hastening the Revolution in America. Owing to his frequent changes in turning to different political factions, he was known as the *Weathercock,* but he enjoyed a high reputation for wit and oratory.

TOXICOLOGY (tŏks-ĭ-kŏl'ŏ-jў), the science that treats of the nature and properties of poison, including their effects and antidotes, and embraces the legal questions connected with poisoning. Any substance which exercises chemical or vital effects upon the body which are injurious to health or life is termed a *poison.* The term *vital effects* has reference to the influences of poison that are probably due to chemical action, but the means available at present do not enable us to understand them clearly. The effect of a poisonous substance may be local or general, but the quantity is a determining factor, since small doses may be taken without injury to the system. Entrance into the body may take place in a variety of ways, in addition to the more usual way of passage through the mucous membrane of the stomach, after swallowing. These include entrance through open wounds, by subcutanaeous inoculation, and through scratches or openings in the skin. Sometimes the system is entered by volatile poisons being inspired with the air. Poisonous substances, to act effectually, must be in the liquid or gaseous state. See **Poison.**

TRACERY (trā'sĕr-ў), in architecture, the ornamental pattern work traced in the head of a Gothic window or gallery. The tracery is perforated for the purpose of admitting the light, usually to further add to the decorations of the building, whence it is sometimes called *open-work.* Styles known as *flowing* and *flamboyant* were first used in the 13th century, and to these was subsequently added the *geometrical* style. When work of this character is applied to ceilings or panelings, it represents a pattern carved on a solid surface in the nature of bas-relief.

TRACHEA (trā'kē-à), or **Windpipe,** the tube situated in the middle line of the neck, beginning at the larynx and terminating in two smaller tubes called *bronchi.* Through the larynx it communicates with the nose and mouth, and through the bronchial tubes it has connection with the lungs. It is from three-fourths of an inch to an inch in diameter and is held open by incomplete rings of cartilage. These rings are transverse, from sixteen to twenty in number, and are held together by muscular and elastic fibers. The tube is completed at the back part by a muscular membrane and within is a layer of ciliated epithelium. Secretions from mucus glands moisten the surface of the membrane, and the cilia have a resisting influence that causes anything coming in contact with them to be drawn toward the mouth. The removal of phlegm is explained by this action of the cilia.

TRACHEOTOMY (trā-kē-ŏt'ŏ-mў), a surgical operation by which the trachea is opened. It is sometimes necessary in certain diseases, such as affect the larynx, or upper portion of the air passages. They include croup, quinsy, diphtheria, and acute laryngitis, and the purpose is to admit air into the lungs to prevent suffocation. Sometimes this operation is resorted to when a foreign body has become so fixed in the air passages as to completely obstruct the transmission of air through the trachea, or when the throat has been cut. The operation does not contribute toward curing the disease or relieving an obstruction, but merely furnishes a means of enabling the patient to breath through the artificial opening thus provided. An incision is first made in the median line of the throat, either below or above the thyroid gland, and the muscles and vessels are pushed aside until the trachea is exposed. A vertical incision is made in the trachea as soon as the bleeding has ceased, and a silver canula is inserted, which sometimes requires the removal of a part of one or more of the rings. The canula is removed when the natural respiration has been restored.

TRACHYTE (trā'kīt), an igneous rock, so named from the roughness of its surface. Rocks of this class are composed chiefly of silica, alumina, magnesia, and oxide of sodium. The colors are usually light, but in some cases are shaded with grayish and darker markings. When feldspar, augite, and hornblende predominate, the rock is classed with varieties of trap, such as basalt and greenstone.

TRACT, a brief treatise on any theme of interest, especially one that treats a religious subject. A tract differs from a book mainly in that it is a short treatise upon a subject and resembles a pamphlet in folding and external appearance. Tracts were published extensively in many countries during times of great religious agitations. A series of papers known as *Tracts of the Times* were published in England between 1833 and 1841 and those who promoted the movement were termed *Tractarians.* It was sometimes called the Oxford Movement, since it originated at the University of Oxford, and favored greater ritualism in the Anglican Church.

TRACTION ENGINE, an engine that serves the double purpose of furnishing power and propelling itself. Engines of this kind are used extensively for agricultural purposes,

especially in threshing, since they furnish the power to operate the separator as well as to remove all the machinery engaged in threshing from place to place. The first steam engines used for this purpose were not constructed on a plan of self-propulsion, hence it was necessary to remove them from place to place by means of horses. Those in common use have a horizontal boiler and a high-pressure engine and are mounted upon four wheels. The front wheels are comparatively small and are steered by a mechanical apparatus, while the rear wheels are large and have broad and heavy tires. An adjustable gear permits attaching the engine to the rear wheels when the machinery is to be propelled over the road, but it is detached during the time ordinary work is done. Engines of this kind range from ten to twenty horse power. Gasoline engines of smaller size are used to some extent for the same purpose.

TRACY (trā'sĭ), **Benjamin Franklin,** statesman, born in Oswego, N. Y., April 26, 1830. He studied law and built up a successful practice in Tioga County, New York, of which he was district attorney in 1854 and 1856. In 1862 he served in the New York Legislature and was soon after appointed by Governor Morgan as a recruiting officer for the Union army. He commanded a regiment in the battles of the Wilderness and Spottsylvania, and was later put in charge of the prison camp at Elmira. He was brevetted brigadier general of volunteers at the close of the war. From 1866 to 1873 he served as United States district attorney, was judge of the New York supreme court from 1881 until 1883, and served as Secretary of the Navy under President Harrison from 1889 to 1893. Subsequently he resumed a successful law practice in New York City. Among the important cases in which he was counsel is the Tilton-Beecher case, serving for the defense. He died Aug. 6, 1915.

TRADE-MARK, a symbol fixed by a merchant or manufacturer to distinguish particular goods from similar products made by others. The principal objects in carrying a trade-mark are to enable purchasers to distinguish certain meritorious commodities in the market, to enable the producers of such articles to profit by their sale, and to guard against imitations being sold for a particular make of goods. Most countries register trade-marks at a nominal fee. In the United States they are registered in the patent office at Washington, D. C. The fee is $25 for the term of thirty years, after which it may be renewed. In Canada the trade-marks are registered for 25 years with the Secretary of Agriculture at Ottawa, the fee being $25 for a specific trade-mark and $30 for a general trade-mark. Labels are used in printing and other lines for the same purpose, especially to indicate union-made goods. The fee for a label is $5.

TRADES UNIONS, the associations of workingmen organized to promote the general and material welfare of the members. The trades unions embrace usually only laborers of the same trade. These organizations are very numerous in Canada and the United States, scarcely any kind of labor being without some form of organized association for mutual aid and protection. The specific objects of the different unions are to regulate the wages and hours of work, to restrict the number of laborers to the actual needs of a particular trade, and to promote intelligence by lectures and the circulation of literature. These organizations are likewise helpful in that they grant benefits to the sick and disabled, relieve those in distress, and provide certain insurance and burial benefits. As a means of mutual defense and intelligence, they add to the value of a man, especially since they tend to increase production and secure for the laborer a constantly growing proportion of the joint product of labor and capital. However, the tendency to limit the number of laborers, especially if effected extensively, has the economical result of diminishing the product and increasing the price.

That trades unions as a whole are beneficial to the workingmen is evidenced by the fact that the best wages and highest intelligence among the working classes are found where they are in a high state of perfection, and, on the other hand, the lowest wages are paid where unions do not exist. The International Typographical Union, organized in 1852, was the first to be formed in the United States. The Machinists' and Blacksmiths' International Union and the Iron Molders' Union of North America were organized in 1859. The Brotherhood of Locomotive Engineers was founded in 1863, the Cigar Makers' International Union in 1870, and the Miners' National Union in 1873. Many others of national and local importance are maintained. In 1894 the power of the American Railway Union became manifest, when its president called out the railroad employees in support of the strike in which the laborers of the Pullman Car Company, Chicago, were interested. This action caused a general derangement of the entire railway system of the United States for a period of three or four weeks, and disturbances were quelled only by the interference of the general government. The American Federation of Labor is an organization formed by an alliance of different national trades unions. The unions in Great Britain have a membership of 1,650,000 and an accumulated fund of $24,500,000. Similar organizations are maintained in France, Germany, and other countries of Europe. See **Labor.**

TRADE WIND. See **Wind.**

TRADING COMPANY, the name applied to any one of several great associations promoted in Europe for the promotion of trade and to extend the colonial interests. Such organizations were promoted extensively in the 16th

and 17th centuries. Those most noted in America are the Hudson's Bay Company, the Virginia Company, and the Massachusetts Bay Company, and through their operations were established the leading British colonies in America. The British East India Company and the Dutch East India Company were two powerful organizations in the exploitation of colonies in Asia. The business was managed by a board of directors, who chose its own officers in most cases, and the members held interests much the same as is the case in a joint-stock company. In most cases they were authorized by the authority of the government as a means of founding colonies and incidentally to promote trade and develop resources. See **Hudson's Bay Company.**

TRAFALGAR (trăf-ạl-gär'), a cape on the southern coast of Spain, projecting into the Atlantic, at the entrance to the Strait of Gibraltar. It is memorable as the scene of a great naval victory by the British fleet under Nelson over the allied fleet of Spain and France under Villeneuve, on Oct. 21, 1805. The allied fleet had 40 vessels and the British had 33, but in the engagement 19 of the former were captured. However, Admiral Nelson was fatally wounded in the encounter.

TRAGACANTH (trăg'ạ-kănth), the name of several species of shrubs found in Asia Minor, belonging to the pulse family. These plants yield the tragacanth of the market, a gum valuable in medicine and for calico printing. It is a hard substance, has a slight taste and no smell, and is difficult to pulverize. When placed in water, it absorbs the liquid and forms an adhesive paste. Though similar to gum arabic, it differs from it in a few chemical properties. As a medicine it is used for treating coughs and catarrhs.

TRAGEDY (trăj'ẽ-dỹ). See **Drama.**

TRAGOPAN (trăg'ô-păn), or **Horned Pheasant,** a species of the crested pheasants, found chiefly in China and India. The bill resembles that of the common fowl, the tail is rounded, and the plumage is variously colored. Instead of a comb, the male has a crest of soft feathers, has two hornlike appendages above the eyes, and is wattled in front on the throat. The appendages are protractile and retractile at will. In their habits they are generally solitary and dwell in the recesses of their native forests. The food consists of grains, roots, and insects. Five species of these birds have been described.

TRAILING ARBUTUS (trāl'ĭng är'bŭ-tŭs), an evergreen trailing plant, sometimes called *ground laurel* and *mayflower.* A number of species have been enumerated, most of which are American. The flowers are white or pinkish, growing usually in clusters, and are noted for their excellent perfume. These plants are admired for their beauty and the fine-scented flowers, but are quite difficult to transplant. The dried leaves of species called the *red bearberry* are used as an astringent and tonic medicine. They possess medicinal value in treating chronic affections of the bladder.

TRAIN, George Francis, author, born in Boston, Mass., March 24, 1829; died Jan. 18, 1904. After engaging in business enterprises in Boston, he made a trip to Australia in 1853, and subsequently promoted street railway building in Liverpool. He made a financial failure in the latter enterprise and began to write for periodicals and to lecture. His addresses became well known because of spicing them with criticisms of English society. In 1862 he settled in New York City and subsequently devoted himself entirely to lecturing and literary work. His publications include "Young America on Slavery," "Young America Abroad," "Spread-Eagleism," "An American Merchant in Europe, Asia, and Australia," "The Downfall of England," "Every Man His Own Autocrat," and "The Championship of Women."

TRAJAN (trā'jạn), **Marcus Ulpius,** emperor of Rome, born near Seville, Spain, Sept. 18, 52; died in Selinus in July, 117 A. D. He descended from a family of Roman origin and showed early military skill in the campaigns against the Parthians and the Germans on the Rhine, in the reigns of Titus and Domitian. His distinguished services caused his appointment to the consulship in 91, and Nerva created him Caesar in 97. On the death of Nerva, in 98, Trajan returned from Germany and ascended the throne, making large gifts to the Roman citizens and soldiers. He concluded peace with the German tribes, introduced reforms in the public service, and in 101 led a large army from Rome against the Dacians, making their country a Roman province in 105. While on this foreign campaign, in 103, he directed an epistle to Pliny, governor of Bithynia and Pontus, in which he instructed that official not to heed anonymous charges against Christians.

TRAJAN.

Trajan entered upon an extensive campaign to the East in 106, annexing Armenia, Parthia, Arabia, Mesopotamia, and other regions. He crossed from the Caspian Sea to the Indian Ocean and was the first Roman to explore the Persian Gulf. The government of Trajan is noted as one of the most vigorous and efficient of Rome. He adorned Rome with splendid buildings and bridges, built canals and highways, and founded new cities. The Trajan column, a famous structure still to be seen at Rome, was built to commemorate his victory over the Ger-

mans. Trajan's wall, extending from the Black Sea to the Danube, is another remarkable work constructed in his reign. The Roman Empire reached its greatest extent under Trajan, and it was said of him that he never permitted a Roman army to be defeated. He founded several libraries at Rome, the most celebrated of which was the *Ulpia Bibliotheca.* Hadrian succeeded him as Roman emperor.

TRAJAN, Arch of, an arch constructed by the Romans at Benevento, Italy. It was erected in 114 A. D. to commemorate the completion of a new road from Rome to Brundisium. The material used is white marble. It is 50 feet in height and has an archway 27 feet high. Trajan's triumphs over the Dacians are represented by elaborate reliefs. This arch is in a good state of preservation.

TRAJAN'S COLUMN, a column erected in ancient Rome to commemorate the reign of Trajan. It was ordered by the senate, completed in 114 A. D., and still stands erect in its ancient beauty. The location is in the midst of the ruins of the Forum of Trajan, a group of public buildings that occupy the space between the Capitoline and Quirinal hills. It is 100 feet high and originally was crowned with the statue of Trajan, but Pope Sixtus V. replaced it with one of Saint Peter. The reliefs are chiefly scenes in the triumphs of Trajan over the Dacians, but in addition include records of ancient costumes and military operations.

TRAJAN'S WALL. See **Trajan.**

TRAMWAY (trăm′wā), a somewhat primitive kind of railway, either for use upon streets or through country districts. In most cases the grading is not as uniform as for electric and steam railways, the rails are made of wooden stringers laid upon ties, and the upper part is protected by straps of iron. Horses and mules are used to move the cars. In the better class of tramways locomotives are employed, though they are usually narrow gauge and of small size. Tramways preceded steam and street railway construction. The first used in the industries were completed in England to transport stone from the quarries to the ports for shipment by water.

TRANCE (tråns), a state resembling sleep, in which the power of volition is suspended and the vital organs are almost inactive. The body, when under the influence of a trance, assumes a ghastly pallor and merges into a state of apparent death. Circulation and respiration cease. Many cases are on record in which persons were actually buried alive, as shown by subsequent exhumations. Trance is associated largely with intense mental exultation and preoccupation, and may simulate death, though patients in most cases recover. *Death trance* is a condition in which neither the heart nor lungs acts and the temperature of the body falls; *trance coma* is characterized by feeble breathing and action of the heart; and *trance sleep* is an abnormally profound and prolonged sleep in which the patient cannot be awakened by external stimuli.

TRANSCENDENTAL (trăn-sĕn-dĕn′tạl), a term applied to ideas and doctrines that are not suggested or limited by experience. Classical writers usually gave the name to anything that rose above or could not be defined by the ten categories of Aristotle. Thus, the state of being was termed transcendental. The name *transcendentalism* is used by Kant in relation to transcendental elements, of which, according to his view, there can be definite knowledge. Among English-speaking peoples the term is applied to a school of thinkers confined chiefly to New England, which flourished from 1830 to 1850. The leading supporters of this movement include George Ripley, who founded a noted transcendental club in 1826. Others that may be mentioned are James Freeman Clarke, Ralph Waldo Emerson, Margaret Fuller, Theodore Parker, and A. Bronson Alcott. The leading tenet of these thinkers is that mind is supreme over matter. They held the view that spiritual truth clearly presented can be perceived by the inborn faculty possessed by every person and that in the soul is an unerring witness to the truth of religion, which they maintained does not depend upon historical facts or tradition. The ideal set up by the leading transcendentalists is "plain living and high thinking."

TRANSFORMER (trăns-fôrm′ẽr), an apparatus for changing the potential of electric currents, so called because it may transform or change the value of the electric motive force in the primary and secondary circuits. A form of the induction coil is commonly used to transform the current from a high to a low potential, as in taking current from the main wires to supply incandescent lights, either individually or in series. Such a transformer consists of a primary and a secondary circuit, in which the primary, or inner, coil has a larger number of terms than the secondary, or outer, coil. In alternating-current transformers the primary and secondary coils are usually placed parallel to and alongside each other. They are provided with a core of laminated iron and the same material surrounds the coils, which insures the greatest amount of magnetic flux passing through them. Transformers are usually placed outside of buildings or on high poles to insure safety, since alternating currents with high electric motive force are dangerous.

TRANSFUSION OF BLOOD (trăns-fū′-zhŭn), the term applied to the injection of blood into a person as a means of treating disease or invigorating the system. The blood thus used may be drawn from a brute or a human being, and it may be injected directly from the vein of one to that of another, or it may first be defibrinated. In medical science it has been known for more than four centuries, but it was rarely practiced prior to 1824, when Dr. Blundell published his "Physiological and Pathologi-

cal Researches." Blood drawn from sheep, dogs, and pigeons has been used to a considerable extent, but the results have proved doubtful. Many cases are on record in which the patients appear to have been benefited, while others seem to indicate that the practice does not possess material value. In theory it is certainly useful, since it replenishes the older and partially diseased tissues with new blood that is calculated to build up vitality and restore impaired or dissipated strength. Saline solutions of various kinds are now infused into the veins instead of blood. Such solutions consist essentially of sodium chloride, about 0.6 per cent., which is the proportion in normal animal tissues. It is raised to a temperature of about 110°, the quantity being from one to two pints, and has been found beneficial in sudden losses of blood or where the patient suffers from a severe shock.

TRANSIT (trăns'ĭt), in astronomy, the passage of one heavenly body over the disc of another, as of Mercury or Venus over the disc of the sun, or of a satellite over the disc of the planet around which is revolves. The term is restricted principally to the passage of the inferior planets, Mercury and Venus, over the disc of the sun. About thirteen transits of Mercury occur every century, the shortest interval between them being about three years and the longest thirteen years. They occur in the early part of May and November, because the earth is then near the nodes of Mercury's orbit. Transits of Venus are of importance in astronomy, since the best means of determining the sun's distance from the earth is afforded by them. They occur at intervals of eight, 105, eight, and 122 years. Both Mercury and Venus are nearest the earth at transit, and their apparent motion is westerly, hence a transit always begins on the east side of the sun.

The transit of Mercury was observed first by Gassendi, in 1631, and the first of Venus was announced by Jeremiah Horrox in 1639. The dates of Mercury's transits are Nov. 5, 1868; May 6, 1878; Nov. 7, 1881; May 9, 1891; Nov. 10, 1894; Nov. 12, 1907; Nov. 6, 1914; and May 7, 1924. The transits of Venus have the following dates: Dec. 7, 1631; Dec. 4, 1639; June 5, 1761; June 3, 1769; Dec. 9, 1874; Dec. 6, 1882; June 8, 2004; and June 6, 2012. A *transit instrument* is used for observing the exact time or measuring the passage of heavenly bodies across the meridian. This instrument resembles a theodolite and consists principally of a horizontal, graduated circle, with leveling devices, clamping screws, a compass, and a telescope. It ranks as the most important of the technical astronomical instruments.

TRANSMIGRATION (trăns-mĭ-grā'shŭn), or **Metempsychosis,** the doctrine of the passing of the soul at death into another mortal body. Those who support the view that the soul transmigrates at death believe that there is a repeated existence of the soul and that its form in each succeeding state is determined by its merits and demerits in the preceding one. Many ancient civilizations grew out of this faith, especially those of Egypt and Asia. This doctrine regards human life on the earth as only one link in a chain of conditions through which the soul passes in its long career of procession from God until it returns to Him.

Brahmanism represents the migration after death into the body of a higher or lower life as a reward of virtue or penalty for vice. The soul may even deteriorate into the lowest animal forms or the vegetable or mineral world. Before it reaches to human consciousness it accomplishes numerous transmigrations, but if the reason and freedom permitted in this life are not utilized to good advantage, the soul is liable to return and begin the series again. A long period of divine years is assigned for the completion of all transformations and the process of purification, after which it ultimately receives its reward in what is described as a state of blissful adsorption into the divine nature. According to Herodotus, the Egyptians believed that the soul is clothed successively with the forms of all the animals that live on the earth and after a long cycle of years it enters the body of a man, when it begins its eternal pilgrimage. The Buddhists hold to a doctrine of transmigration, but differ from the Brahmans in that they believe in the ultimate annihilation of the soul, which is said to take place in Nirvana.

The doctrine of transmigration had a prominent place in the philosophy of Pythagoras, hence came to be deeply rooted among the Greeks. He maintained that the soul has a life peculiar to itself, which it enjoys in common with demons and spirits before it descends to the earth, and that there must be a degree of harmony between the faculties of the soul and the form which it assumed. At death the soul becomes freed from the fetters of the body and remains for a time in the realm of spirit, when it returns to the earth to accomplish again the process of purification through a series of animal and human bodies. Plato adopted the doctrine and maintained the preëxistence of the soul before it appears in man, of which condition it retains dim recollections, and after death it chooses another body according to its peculiar qualities. He thought that every soul returns to its original source after a long cycle of years, but certain periods are to be passed in the infernal world. Mention of the doctrine is made by Cicero and Caesar. It is referred to in the Talmud and was supported by heretical sects among the early Christians. While the general belief in transmigration seems to be permanent in the East, it has been defended by a few metaphysical writers in America and Europe.

TRANS-MISSISSIPPI EXPOSITION, an industrial exhibition of the United States, held at Omaha, Neb., in 1898. It was designed to

display the progress made in the arts and industries of the section of country lying west of the Mississippi and to extend the general interest in the development of its extensive resources. The tract occupied by the grounds included 200 acres in the northern part of the city, overlooking the Missouri River. Many states had buildings, or made special exhibits, and a fine display was made by the Federal government. The architecture was elaborate and the grounds were ornamented with fine shrubs, trees, and flowering plants. A total attendance of 2,613,508 was registered.

TRANSPORTATION, the industry of carrying persons and goods from one place to another. The means of transportation depend upon the development of trade within a country and are influenced noticeably by the complexity of its economic system. Anciently trade was carried largely by water, at which time internal commerce was necessarily limited. The first steps toward the development of means of inland transportation is found in the construction of canals and highways, and the first important systems of these avenues were developed in Rome. Modern transportation greatly overshadows that of ancient times, both upon land and sea, owing to the application of steam in navigation and the construction of railway and electric lines.

Transportation has greatly added to the comforts of mankind, chiefly through the fact that modern methods permit rapidity and insure a high degree of safety. Although it must be admitted that losses of considerable extent attend the enterprise of conveying passengers and goods rapidly and at great distances, yet there is greater security than prevailed under the methods of the ancients. Modern steamships are constructed of steel and other durable materials, and their great size and accuracy of movement render them much more secure than the inadequate and wooden structures of former periods. On the other hand, the losses by accidents on railways are comparatively small, especially when considered in the light of dangers that attended the slow-moving caravan that furnished the chief means of transportation in Asiatic countries for long periods. It is now possible to gain the advantage of travel, both within one's own country and abroad, and this factor in civilization is taken advantage of more extensively as the means of travel are extended. Besides, the products of different belts of climate and soil may be enjoyed by the people in a condition as favorable as where they were produced. This has given rise to the use of a larger variety of commodities and has brought the greater benefits of many localities to the homes of those who would otherwise be entirely deprived of them. See **Commerce; Interstate Commerce; Navigation; Railroads.**

TRANS-SIBERIAN RAILWAY. See **Railroads.**

TRANSVAAL (trăns-väl'), a British colony in South Africa, lying north of the Vaal River, which separates it from the Orange River Colony. It is bounded on the north by Matabeleland; east by Portuguese East Africa and Swaziland; south by Natal and the Orange River Colony; and west by Bechuanaland and the Bechuanaland Protectorate. It has an area of 117,732 square miles, of which 6,536 square miles are included in Swaziland, a dependency.

DESCRIPTION. Most of the interior is an elevated plateau ranging from 3,500 to 6,000 feet above sea level. It is divided into the two regions known as Grass Veldt and Bush Veldt. The former is an arid tract covered with nutritious grasses. The Bush Veldt is well wooded and comprises the valley of the Oori Limpopo, or Crocodile, River and a narrow strip along the eastern border. In the east central part are ranges of the Drakenberg Mountains, which extend north and south through the country and reach their highest summits in Mauch Mountain, height 8,975 feet. The Limpopo Mountains form the eastern boundary, separating the country from Portuguese East Africa. A range of highlands extends through the country from east to west, known as the Witwatersrand, with a general elevation of 6,000 feet, which form the watershed between the Vaal and the Oori Limpopo rivers. Ranges extend from the main ridge both north and south.

The northern boundary is formed by the Oori Limpopo River, which furnishes the main drainage. It receives the inflow from the Olifant River after the latter crosses the eastern border into Portuguese East Africa. A large part of the southern boundary is formed by the Vaal, a tributary of the Orange River. Swaziland is drained mainly by the Maputa, which discharges into Delagoa Bay, an inlet from the Atlantic. The Transvaal is an interior country, having no sea coast, and none of its rivers is navigable. The climate is favorable to Europeans, and in the northern part assumes a subtropical character. July is the coldest month and January is the warmest. The mean temperature is 67°. Frosts occur in winter, but chiefly in the highlands. Rainfall is abundant in the valley of the Oori Limpopo and the eastern section, where it averages 28 inches, but it is scant in the western part. Acacias, the eucalyptus, and other trees native to warm climates thrive in the fertile and well-watered parts.

INDUSTRIES. Mining is the principal occupation, and gold, coal, and diamond are the chief minerals. Barberton and the Witwatersrand have the most productive gold fields, and the total output for the colony is about $125,500,000 per year. Coal is produced for export to other points in Africa and to European countries. The output of diamonds is placed at $5,500,000 per year. Other minerals include tin, copper, silver, lead, iron, cobalt, platinum, and plumbago, but these have not been developed extensively.

Agriculture is possible only in a limited district without irrigation, and improvements of this character are not extensive at present. The farms are usually of large size, and stock raising is a more important department than the cultivation of the soil. Kaffir corn, wheat, barley, and oats are the principal cereals. Vegetables and fruits are grown successfully. Stock raising is a very important industry, the climate and native grasses being highly favorable to this enterprise. Cattle and sheep are grown extensively and large interests are vested in horses, swine, and ostriches. Tobacco of a good quality yields well. Much of the farming is in the hands of Europeans, but labor in the mining and manufacturing industries is furnished largely by Chinese and natives.

A large part of the manufacturing is in connection with the mining and is represented by smelters and machine shops. Flour and grist mills, brick and tile works, breweries, and iron and brass foundries make up the chief enterprises. Among the general manufactures are malt liquors, brick and tile, cigars and pipe tobacco, clothing, and machinery.

The railroads in operation include 3,125 miles and are connected with those of the Orange River Colony. A branch extends from Pretoria east to Lourenço Marquez, on Delagoa Bay. The total length of telegraph lines is 3,250 miles. Gold, diamonds, live stock, wool, coal, tobacco, and lumber are the principal exports. The imports consist chiefly of textiles, foodstuffs, chemicals, clothing, and machinery. A large majority of the trade is with Great Britain.

Government. A responsible government was established in 1906 by letters patent. The Governor and Lieutenant Governor are assisted by an executive and a legislative council. Authority to legislate is vested in the legislative council and legislative assembly. Members in the former are appointed by the Governor, while those of the latter are elected for five years. All laws and public documents are printed both in the English and Dutch languages.

A free public school system was established in 1907. The attendance at the schools is obligatory for white children between the ages of eight and fifteen years. Both English and Dutch are taught in the schools. High schools are maintained in the towns and cities. The Transvaal Technical Institute, located at Pretoria, carries courses in mining, engineering, and commerce. The schools and institutions are nondenominational.

Inhabitants. The people residing in the Transvaal include many races, both native and European. In 1921 Swaziland had a total population of 85,484, of which 898 were whites. The Transvaal in the same year had a population of 1,976,611, which included 420,831 whites. The Europeans include principally British, Russians, Germans, Dutch, and Italians. Several thousand Americans and Australians reside in the colony. A large majority of the Christians belong to the Dutch Reformed Church. Other religious denominations include Anglicans, Roman Catholics, and Jews. Pretoria, in the central part, is the capital. Johannesburg, the center of the Witwatersrand, is the largest city. Other cities include Barberton, Nylstroom, Heidelberg, and Lichtenburg.

History. The Transvaal country was first settled by Boers in 1845, these sturdy and industrious people leaving Natal in that year owing to its annexation as a colony by Great Britain. They were direct descendants from the Dutch who established a port of call near the Cape of Good Hope in 1662. When the British annexed the Cape Colony, in 1814, large numbers of Boers settled in Natal, and subsequently in the Orange province and the Transvaal. The British government recognized the independence of the Transvaal in 1852, but in 1877 assumed general sovereignty. In 1880 the Boers made a successful armed effort for independence, the war terminating by a disastrous defeat for the British at Majuba Hill, and in March, 1881, the independence of Transvaal was again recognized. In 1884 the British made another effort to annex the Transvaal and, after conducting complicated diplomatic proceedings, secured a partial sovereignty.

The discovery of gold in the Rand, in 1885, caused the British to seek further influence, leading eventually to the untimely Jameson Raid of 1896, which proved an unsuccessful venture to annex the republic. War was finally declared by the republic on Oct. 11, 1899, and the Orange Free State immediately cast its fortunes with the Transvaal, Great Britain manifesting a disposition to annex both republics as a means of protecting the interests of many subjects who had made settlements within the region. The first battle of importance occurred at Ladysmith on Oct. 30, when the British met a reverse. Subsequently the Boers were defeated in a number of engagements, though they made a stubborn resistance, and on Oct. 25, 1900, the region was annexed by Great Britain. In 1907 the government greatly restricted the immigration of Asiatics, especially Chinese, as a means of protecting native laborers. In 1910 it was joined with Cape Colony, Natal, and Orange River Free State to form the Union of South Africa.

TRANSYLVANIA (trăn-sĭl-vā′nĭ-ȧ), in German *Siebenbürgen,* a principality in the southeastern part of Europe, formerly part of the Austro-Hungarian Empire. The area is 21,518 square miles. It lies between the Carpathian and Transylvanian mountains, the boundary being formed by Galicia, Rumania, and Hungary. The surface is largely mountainous, but it has many fertile valleys and plains. Among the chief rivers are the Maros, Körös, Aluta, and Szamos, all being tributary to the Danube. Gold, silver, copper, quicksilver, coal, lead, iron, salt, alum, tin, limestone, and precious stones are among

the minerals. Fine forests are abundant, especially along the streams and in the mountains. Agriculture is the leading industry, the products being wheat, hemp, maize, rye, barley, flax, tobacco, vegetables, and fruits. Stock raising, silk culture, and manufacturing are likewise important industries. The manufactures include silk and woolen textiles, soap, paper, furniture, jewelry, glass, gunpowder, and machinery. Education is still in a backward condition, but common schools have been established in all parts of the principality. A university is maintained at Klausenburg and secondary schools flourish in a number of the leading cities. Railroad lines have been constructed through most of the regions producing minerals and containing arable lands. The chief cities include Kronstadt, Klausenburg, Hermannstadt, and Bistritz. A large number of the inhabitants are Germans, but the population includes Bulgarians, Jews, Magyars, Rumanians, and Gypsies. Transylvania belonged to Dacia at the time of the Roman Empire, but with the decline of Rome passed successively to the Huns, Lombards and Goths. It became a part of Austria in 1713 and was transferred to Rumania in 1919. Population, 1922, 2,490,680.

TRAP, or Trappean Rock, the name generally applied to the primary and secondary strata of igneous rocks. The term is derived from the Swedish word *trappa,* meaning a stair, and is given to these rocks because their greater hardness resisted erosion, thus making them stands out on hills and mountains like steps or stairs. They are formed chiefly of hornblende and feldspar. Those in which feldspar predominates are known as *feldspathic trap* and those composed largely of hornblende are called *hornblendic trap,* or *greenstone.* The latter is of a greenish color and is peculiarly crystalline. Feldspathic trap resembles flint in compactness and is of a light bluish or greenish color. Other species of trap rocks include the *clinkstones, basalts, pitchstones, feldspar, porphyries,* and *claystones.* Basalt is the heaviest of the trap rocks and is likewise the hardest and most compact. Rich agricultural soil is produced by the decay of trap rock, and districts having these rocks are usually quite fertile. Deposits of hypersthene rocks are abundant in Labrador. Several choice varieties of trap occur in the Isle of Skye.

TRAPANI (trä′pä-nē), a city of Sicily, capital of the province of Trapani, 45 miles west of Palermo, with which it is connected by railway. It is important as a seaport and has a municipal palace and several fine churches. The industries include salt works, shipyards, fisheries, and flouring mills. It has a large trade in wine, olive oil, marble, shell cameos, and fruits. The Carthaginians fortified the place in the 3d century B. C., but it was soon after captured by the Romans. Anciently it was known as Drepanum. Population, 1922, 59,854.

TRAPDOOR SPIDER, the name of a species of spiders found in warm climate, so called from the manner in which they construct their nests. The body is hairy and quite large. Several species are common to southern California, Mexico, and the warmer parts of Europe. These spiders dig a burrow in sloping ground, usually six to ten inches deep, and cover the same with a trapdoor made of silk. The interior is usually lined with silk, and the door is attached by a hinge so it may be easily opened and closed. When within the burrow or nest, the spider, on the approach of danger, holds the door down with its mandibles and feet. Some species construct two or more of these nests and connect them below the surface with tubes large enough for passage. The young live in the burrow for several weeks, where they are fed on insects and worms, and soon construct nests for themselves.

TRAPPING, the art of catching birds and other animals by means of traps and snares. This mode of taking game is preferred in that the skin and flesh are less liable to injury than by the use of weapons. Traps for catching various animals, such as the mink, beaver, and fox, are usually made of steel and vary in size according to the kind of animal to be taken. The small traps have one steel spring, while those of larger size usually have two. The trap is set near the hole or habitation of the animal and is securely anchored so as to hold the captive. Usually the trapper sets a bait to allure the animal to the place where it may be caught, and usually visits each trap once or twice a day to remove the captives. Snares are commonly used to catch birds and some quadrupeds, and in many cases box traps are employed for the same purpose. In some countries the use of box traps is forbidden, especially in catching such birds as the quail and grouse.

TRAVELER'S TREE, a tree native to Madagascar, classed as a kind of plantain, having a palmlike appearance. The stem is smooth and without branches to a height of twenty to thirty feet, and at the top is a peculiar growth resembling a large fan. The leaves grow on extended stalks, which are on opposite sides of the upper stem of the tree, the lower leaves dropping off as the stem grows. A large tree has from fifteen to thirty leaves, the leaf stalks being ten feet in length. The leaves are five to six feet long and frequently about three feet wide. The color of the leaves is bright green. They are used for thatching, while the leaf stalks serve in constructing walls and other parts of buildings. A succulent fruit, growing in bunches, is produced amid the leaves, and the seeds yield a flour utilized by the natives as a food. The tree derived its name from the hollow leaf stalk, which contains a wholesome water even in the dry season, and is used by travelers in quenching thirst.

TRAVERSE CITY (trăv′ẽrs), a city in the northwestern part of Michigan, county seat of Grand Traverse County, at the southern end of

the western branch of Grand Traverse Bay. It is on the Erie and Michigan, the Père Marquette, and the Manistee and Northeastern railroads. The bay is an inlet from Lake Michigan, extending inland about thirty miles. In the southern part it divides, and between the eastern and western arms is a tract of land known as Preogenese Point. Traverse City has fine steamboat facilities and is a favorite summer resort. Cereals, grasses, fruits, and live stock are grown in its vicinity. The chief buildings include the county courthouse, the public library, and the Northern Michigan Insane Asylum. Among the manufactures are lumber, furniture, woodenware, cigars, clothing, and machinery. Electric lights, pavements, waterworks, sewerage, and street railways are among the improvements. It was settled in 1850 and incorporated in 1895. Population, 1904, 11,237; in 1920, 10,925.

TRAVERTINE (trăv'ẽr-tĭn), a species of limestone. It is usually whitish in color and occurs in masses deposited by the action of rivers and springs. Fossils of leaves and twigs are common in some deposits. Many buildings of Rome are constructed of this class of rock.

TRAVIS, William Barrett, soldier, born in Edgefield County, South Carolina, in 1811; died March 6, 1836. He studied law, was admitted to the bar in 1830, and established a successful practice at Claibourne, Ala. In 1832 he went to Texas, where he joined the party that favored Texan independence. He commanded a force of 140 men at Fort Alamo, which was besieged in 1836 by a large detachment of Mexicans. The Americans defended the fort for ten days, when the six remaining alive were compelled to surrender, but they were ordered cut to pieces by Santa Anna. During the siege 32 escaped and vainly attempted to send reinforcements.

TRAWLING (trạl'ĭng), a method of fishing in the deep sea. It consists of dragging a net along the bottom behind a boat, or by attaching the ends to two small steam vessels, which move slowly and pull the net. A trawl or beam trawl is a purse-shaped net from fifty to seventy feet long, and the mouth is held open by a wooden beam. This net is drawn by a single boat, or larger sizes, in which the mouth is forty feet wide, may be pulled by two vessels. Trawling can be done only where the bottom is smooth or sandy, and is usually not permitted near the shore. Much of the fishing in the German ocean is by this method, where large quantities of herring, haddock, and mackerel are taken. The term *trawl* is applied in America to a long line to which short lines with baited hooks are attached.

TREADMILL (trĕd'mĭl), an appliance used to discipline prisoners, employed formerly in Great Britain. It consists of a wheel in the form of a long cylinder, furnished with steps around its circumference, and is moved by the tread of the prisoners. A hand rail furnishes support, and the weight of the prisoner causes the wheel to revolve about twice per minute. Formerly it was customary to utilize the motive power of the treadmill for grinding corn and turning machinery, but the labor expended upon it is too large in proportion to the usefulness of this contrivance.

TREASON (trē'z'n), the crime of levying war or committing any act of hostility against a state by one who owes allegiance to it. The punishment for this offense is very severe, since the crime is held to be one of the greatest of which any citizen may be guilty. Those who know of the crime of treason and fail to disclose the fact to the authorities are guilty of concealment of treason, which is punishable by fine and imprisonment. In general, treason consists in levying war upon the country or in adhering to the enemies, giving them aid and support. The punishment depends upon the occasion or circumstances under which the crime was committed, but it usually consists of imprisonment at hard labor for a long term of years. If committed at the time of a great conflict, the guilty party is usually punished by death.

TREASURE-TROVE (trĕzh'ûr-trōv), the name applied to coin, bullion, or precious metals found hidden in the earth or any private place, the ownership of which is unknown. Objects of value thus found on land belonging to the finder, under the law of Rome, belonged to the person who discovered the treasure, but if the land belonged to some one else the objects found were divided equally between the finder and the owner of the premises. The common law of England vests the finder of such treasures in the crown, though this is not strictly enforced. In the United States the term treasure-trove is not used extensively. A treasure found belongs to the finder, unless the true owner is known, when the title is vested in him.

TREASURY (trĕzh'ûr-ў), **Department of.** See **United States, Departments of.**

TREATY (trē'tў), a contract or agreement concluded by two or more nations or sovereigns. It is in the nature of a contract, and the parties to it rely upon the good faith of those concerned to carry out the matters stipulated. Treaties are usually made by commissioners duly appointed by the respective governments, and they are binding upon the nations concerned as soon as they are ratified by the sovereigns or the branch of government duly authorized to approve such agreements. In general the power to ratify is vested in the crown of a monarchy and in the chief executive and legislative branch of republics. The latter is the case in the United States, whose negotiations are conducted by commissioners and the power to ratify is vested in the President and the Senate. Treaties are known according to the purpose for which they are intended, as *offensive* and *defensive, treaties of alliance, commercial treaties,* and *treaties of peace.*

TREBBIA (trĕb'bĕ-ȧ), a river in the north-

ern part of Italy, anciently called *Trebia*. It rises 15 miles northeast of Genoa, in the Ligurian Appenines, and, after a course of 58 miles, joins the Po near Piacenza. The Trebbia is famous in history, owing to the defeat of the Romans under Sempronius by Hannibal in 218 B. C. The Austrians and Russians under Suvaroff defeated the French under Macdonald, in 1799, upon its banks.

TREBIZOND (trĕb'ĭ-zŏnd), a seaport city of Asiatic Turkey, on the southeastern coast of the Black Sea. It occupies a site surrounded by hills and is inclosed by substantial walls, on the outside of which are numerous suburbs. Trebizond is well paved and drained, but the architecture is inferior in most parts of the city. Several forts defend the city, and toward the interior are a number of well-established highways. The harbor is one of the finest on the Black Sea, thus giving the city excellent facilities to handle a large interior and export trade. Among the principal structures are a number of mosques, several hospitals and government buildings, and ten Greek churches. It has manufactures of fabrics, hardware, copper products, dyestuffs, and clothing, and is the center of a large export trade in wool, wax, oil, raw and manufactured silk, and tobacco products. The city was anciently known as Trapezus and flourished in the time of Xenophon. The Romans conquered it in the Mithridatian War. Trajan constructed extensive harbor improvements at this place. The Crusaders captured it in 1204, when it became the capital of the empire of Trebizond, which included a large region south of the Black Sea. It was in possession of Turkey from 1461 until 1916, when it was captured by the Russians. Population, 1922, 55,350.

TREE, Herbert Beerbohm, actor, born in London, England, Dec. 17, 1853; died July 2, 1917. He was the second son of Julius Beerbohm, a German resident of London, and was educated there and in Germany. In 1878 he made his first appearance as *Grimaldi* at the Globe Theater and for some time scored many successes. He won applause by playing in "The Private Secretary" at Prince's in 1884. Three years later he became manager of the Comedy Theater, and subsequently took charge of the management of His Majesty's Theater. He made successful tours of Canada and the United States, winning applause in numerous Shakespearian and other plays. He published "The Imaginative Faculty" and "Fallacies of the Modern Stage."

TREE FROG, or Tree Toad, a class of tailless batrachians that form the connection between the toads and the frogs. They live chiefly in trees, which they are able to climb by reason of their claw-shaped toes. The upper jaw and vomers have teeth. They are small, more active, and brighter colored than the true frogs, and utter loud, piping notes. Many species have been enumerated, but the larger number is found in the warmer regions. They differ widely in colors, though the majority take on the hues of the trees they habitate.

TREFOIL (trē'foil), or **Bird's-Foot,** a genus of plants of the bean family. Many species are native to the temperate region of the Northern Hemisphere. The common trefoil has a stem from four to fifteen inches long, which usually is spreading and decumbent, and bears from four to ten yellow flowers. Some have associated this flower with the shamrock of Ireland. Several species are native and others have been introduced in Canada and the United States. These plants include a number which are of value as forage and are grown to some extent as fertilizing, being covered by plowing.

TREMOLITE (trĕm'ō-līt), a species of hornblende. It consists chiefly of calcium and magnesia and has a white or grayish color. The forms are usually prismatic and crystalline.

TRENCH (trĕnch), **Richard Chenevix,** clergyman and author, born in Dublin, Ireland, Sept. 9, 1807; died in London, England, March 28, 1886. He graduated from Cambridge in 1829 and, after traveling for several years, settled as clergyman in Hampshire. In 1835 he published "Story of Justin Martyr and Other Poems," a work of considerable merit, and in 1842 issued his "Poems from Eastern Sources." Among the most noteworthy of his publications not already named are "A Study of Words," "Gustavus Adolphus, with other Lectures on the Thirty Years' War," and "Sacred Latin Poetry."

TRENCH, an excavation in the earth, made during a siege, for the purpose of defense in an open field, or to protect the troops as they advance toward a besieged place. Trench warfare reached its greatest extent in France, both for offense and defence, in the great battles fought in the period from 1914 to 1918. An estimate made in 1917 placed the trench works between Switzerland and the North Sea, a battle line of 450 miles, at fully 12,000 miles, including the reënforced works at Verdun and Amiens.

TRENT, a river of Canada, in Ontario. It rises in Rice Lake and discharges into the Bay of Quinté, an inlet from Lake Ontario. The length is 150 miles and it affords good water power. It drains a basin of 4,000 square miles.

TRENT, a river of England, which rises in Staffordshire and 15 miles west of Hull joins the Ouse to form the Humber. The total length is 145 miles and it is navigable for barges about two-thirds of its course. In commercial enterprises it ranks of importance next to the Severn and the Thames. The Trent and Mersey Canal is one of several important artificial waterways of the system in which the Trent is a factor.

TRENT, or **Trient,** a city in northern Italy, in the southern part of Tyrol, 48 miles north of Verona, Italy. It is located on the Adige River, has railroad facilities, and is surrounded by limestone hills. The Adige valley is remarkably fertile, containing fine farms, vineyards, and orchards. Trent is celebrated in history as the

seat of the Council of Trent, which met here in the pontificate of Paul III., in 1545, but was removed to Bologna the following year. It was dispersed in the latter year as a result of the Protestant rising in Germany, but was again convoked by Pope Julius III., in 1551, and was again dispersed by the Lutherans. Pius VI. called it into session in 1551 and four years later its labors were completed. The Council of Trent issued canons and decrees defining the doctrines of the Roman Catholic Church. They were reprinted innumerable times and have been translated into most modern languages. The city of Trent has considerable trade, numerous schools and churches, and is supplied with public parks, a library, and other municipal facilities. It was a free imperial city until 1802, when it became a part of Austria, and in 1920 was made a part of Italy. Population, 1922, 25,238.

TRENT, William Peterfield, author and literary critic, born in Richmond, Va., Nov. 10, 1862. He completed a course of instruction at the University of Virginia and subsequently at the Johns Hopkins University. In 1888 he was made professor of English in the University of the South at Sewanee, Tenn., where he worked efficiently until 1900, when he became professor of English literature in Columbia University. He founded the *Sewanee Review* in 1892 and was its editor about eight years. Besides contributing to periodical literature, he published a number of historical works and criticisms. Among his chief publications are "The Authority of Criticism," "English Culture in Virginia," "Southern Statesmen of the Old Régime," "Life of Robert E. Lee," "War and Civilization," and "A History of American Literature."

TRENT AFFAIR, a complication arising between the United States and Great Britain at the beginning of the Civil War in America. The Confederate government sent J. M. Mason and John Slidell as commissioners to Great Britain and France respectively in 1861. They passed the blockade and embarked on the British merchant ship *Trent,* which sailed from Havana, Cuba. Captain Wilkes, of the United States ship *San Jacinto,* stopped the *Trent* near the Bahamas on Nov. 8, 1861, and seized Mason and Slidell as prisoners of war. The Northern States generally approved Wilkes's action, but it involved a violation of the international law and the two prisoners were surrendered to Great Britain because its neutral rights had been transgressed, thus preventing the war that country threatened.

TRENTON (trĕn'tŭn), the capital of New Jersey, county seat of Mercer County, 56 miles southwest of New York City. It is situated on the Delaware River, at the head of Navigation, and on the Delaware and Raritan Canal, the Pennsylvania and the Reading railroads and has communication by several surfaced public highways. An extensive system of electric railways furnishes communication to all parts of the city, and with it are connected trolley lines that penetrate many parts of New Jersey and the adjoining states.

The city is finely located on a pleasant site and the streets are well improved with cement, asphalt, and macadam pavements. The improvements include waterworks, sewerage, gas and electric lighting, and a system of public parks. Stacy Park and Cadwalader Park are fine public resorts. The spot where Washington placed his cannon at the Battle of Trenton is marked by a granite shaft surmounted by a bronze statue of Washington. A monument of George B. McClellan is situated in Riverview Cemetery. The State capitol is a fine structure of substantial materials. Other buildings include the county courthouse, the high school, the Masonic Temple, the State armory, and the post office. It is the seat of the State prison, the New Jersey Home for Girls, a State normal school, the State arsenal, and numerous hospitals and private institutions of learning. The public libraries contain about 227,000 volumes and in addition there are several other collections of books, including those of the State and the public schools.

Trenton has a large wholesale and jobbing trade. The manufacturing establishments represent a large capital. Among the enterprises are potteries, machine shops, brickyards, iron and brass foundries, and lumber yards. The general manufactures include refrigerators, rubber goods, bridges, cotton and woolen textiles, machinery, and linoleum. It is the seat of the Jordan L. Mott iron works, the American Bridge Plant, the De Laval Steam Turbine Works, and the wire and cable factory of John A. Roebling's Sons Company.

The first settlement at Trenton was established in 1676, when it was generally known as The Falls. It received its name from William Trent in 1720, when the town was platted, and it was incorporated in 1746. Trenton was made the capital of the State in 1790 and two years later received its charter as a city. Population, 1905, 84,180; in 1920, 119,289.

TRENTON, a city in Missouri, county seat of Grundy County, on the Grand River, 102 miles northeast of Kansas City. It is on the Quincy, Omaha and Kansas City and the Chicago, Rock Island and Pacific railroads. The place has a fine trade and is surrounded by a fertile farming and fruit-growing region. Extensive coal mines are worked in its vicinity. Among the principal features are the high school, the Jewett-Norris Library, and Moberly Park. The municipal facilities include systems of waterworks and sanitary sewerage. Among the manufactures are lumber products, brooms, tobacco, bread, and dairy products. It has a growing trade in farm produce, coal, and merchandise. Trenton was settled in 1840 and incorporated in 1857. Population, 1920, 6,951.

TRENTON, Battle of, an engagement of the Revolutionary War, fought at Trenton, N. J., on Dec. 26, 1776. The British were sta-

tioned at Trenton, whence they had pursued Washington, who took a position on the other side of the Delaware River. The garrison consisted of 1,500 Hessians under Colonel Rahl, and Washington planned to cross the river and make the attack while they were engaged in their Christmas festivities. With a part of the American army, Washington crossed the Delaware while that stream was partly covered with floating ice, and at about eight o'clock in the morning surprised the garrison, which had not prepared for a resistance. The Americans lost only two killed and three wounded, while the British lost forty killed and wounded and about 1,000 prisoners. Washington recrossed the Delaware and occupied his former position. This victory and that at Princeton on Jan. 3, 1777, greatly revived the spirit of the Americans.

TRENTON SERIES, a group of rocks deposited during the Lower Silurian period, so named from Trenton, N. Y., where they were first studied. This series of rocks extends over large areas in the United States and the southern part of Canada. It is composed chiefly of limestone and in various places contains valuable minerals, such as natural gas and petroleum in Ohio and Indiana and lead and zinc ores in Iowa and Wisconsin. Outcroppings extend along the northern shores of Lake Ontario as far west as Georgian Bay. In thickness the series ranges from 100 to 2,000 feet, being thickest in Pennsylvania.

TREPANG (trē-păng'), or **Beche de Mer,** the name of a marine animal, the sea slug, commonly called *sea cucumber.* It is found along the eastern coast of Asia, in the West Indies, and the region east of Australia. The body is from eight inches to two feet in length. These animals are caught in large numbers and dried and are popular as food in China. Trepang is the name of the dried product, which is almost tasteless but highly nutritious. It is used chiefly in preparing soups.

TREPHINING (trē-fīn'ĭng), or **Trepanning,** an operation on the human skull, which consists of cutting an opening or making a perforation with the trephine, or trepan. The cutting edge of this instrument consists of a circular saw-toothed device about half an inch in diameter and is operated by means of a handle, similar to that of an auger. In case of fracture, especially where broken fragments of bone extend across the brain, this instrument is useful in cutting the attached end so it can be removed. Cerebral abscesses are often relieved by trephining, but the openings are made as small as possible, usually one-fourth of an inch, and if necessary are afterward enlarged by the chisel.

TRESPASS (trĕs'pȧs), in law, an offense committed against a person, the property, or the rights of another, such as an unlawful but peaceable entry upon the property of another. Mere words, without some action, do not constitute a trespass. A suit at law for damages may be maintained in such a case and the intention of the trespasser is immaterial, since the law takes into account the damages and not the intention. A person who aids or incites the perpetration of a trespass is liable as well as the direct perpetrator, and the principal who has given authority to an agent may be liable for trespass committed by the latter. A peaceable entry into a house or upon the land of another, with intention to take possession and oust the true owner, is regarded as a trespass. One who enters the house of another without permission, or walks over his ground, or suffers cattle and other live stock to stray upon it, commits the offense of trespass, and the owner has the right to an action for damages. In cases where a municipality or county places a restraint upon cattle and other live stock running upon the streets and highways, the owner of such stock is guilty of trespass if he permits it to run at large. In such a case he is subject to a fine and, if such stock enters upon private property, he may be held liable for damages.

TREVELYAN (trē-vĭl'yȧn), **Sir George Otto,** author and statesman, born at Rothley Temple, England, July 20, 1838. He was the only son of Sir Charles Edward Trevelyan (1807-1886), studied at Cambridge University, and in 1865 became a member of Parliament, where he was a loyal supporter of Gladstone. In 1880 he became Secretary of the Admiralty and in 1885 was made Secretary of Scotland. His writings include "Life and Letters of Lord Macaulay," "The American Revolution," "The Competition Wallah," and "Early History of Charles James Fox."

TRIANGLE (trī'ăn-g'l), in geometry, a figure bounded by three straight lines, the most simple of geometrical figures. The side upon which it rests is called the *base;* the point of the angle opposite the base is the *vortex;* and the lines extending from the base to form the vortex are termed the *sides.* The angles of the triangle are the angles formed by the sides with each other. Triangles are classed according to the relative length of their sides—into *equilateral,* or equal-sided; *isosceles,* or with two sides equal; and *scalene,* or unequal-sided. A triangle is *right-angled* if one of its angles is a right angle. It is *obtuse-angled* when one of its angles is greater than a right angle, and it is an *acute angle* when it has no angle so great as a right angle. If all the sides are straight lines, it is termed a *plane,* or *rectilinear, triangle.* A triangle whose three lines are curved is said to be *curvilinear.* A *spherical triangle* is one whose sides are arcs of great circles of the sphere. To find the area of a spherical triangle, it is necessary to multiply the spherical excess by the square of the radius of the sphere; the spherical excess is found by subtracting 180° from the sum of the three angles.

TRIANON (trē-ȧ-nôn'), or **Grand Trianon,** the name of a villa built by Louis XIV. in Ver-

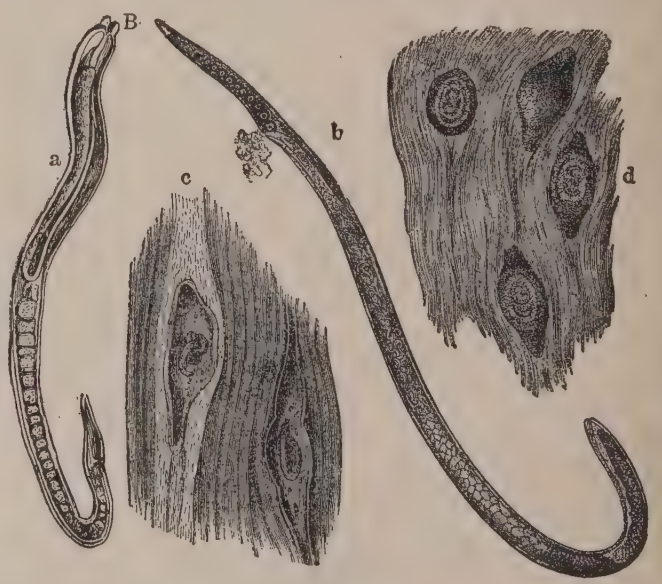
sailles, France. This structure was completed in 1685 as a residence for Madame Maintenon and is a handsome building of one story. It was the scene of the trial of Marshal Bazaine in 1873. Another building, known as the Petit Trianon, was built for Madame du Barry by Louis XV. in 1776. Near it are several Swiss cottages and a lake. Marie Antoinette resided here for some time.

TRIASSIC SYSTEM (trī-ăs'sĭk), a group of rocks belonging to the Mesozoic period, immediately following the Permian and preceding the Jurassic systems. The name originated from the fact that the formations in Germany are grouped in three series, including the local divisions of *Buntersandstein,* or spotted sandstone; *Muschelkalk,* or mussel chalk; and *Keuper* marls, or copper marls. More recently the Rhaetic clays and sandstones overlying those mentioned have been added. The rocks of the Triassic System are widely distributed in Europe and Asia, but are less clearly marked in Australia and Africa. They are represented extensively in Canada and the United States and are particularly abundant along the Hudson River, where they make up a large part of the Palisades. In the region of the Pacific coast, both in Canada and the United States, they reach a maximum thickness of nearly 5,000 feet. Many fossils are found in this formation, including ferns, conifers, fishes, and gigantic reptiles, such as the dinosaurs and plesiosaurs.

TRIBE, the term applied to a subdivision of a nation or stock that has not been organized as a civil state. The principal divisions of the Roman people were known as tribes. In general, the development of a nation begins with the clan, passes through the tribal state, and finally merges into the larger and more completely organized body known as the nation. Romulus divided the Romans into the three tribes known as the *Ramnenses,* the *Titienses,* and the *Luceres,* who probably represented the Latin, the Sabine, and the Etruscan elements, respectively. Each of these tribes was subdivided into ten *curiae,* and these were required to furnish a given proportion of the military forces for general defense and offense. The ancient people of Greece are frequently mentioned as divided into tribes, which appear to have developed from various clans, and later from territorial or political divisions. Since the Greeks were a nation of different races, the tribes frequently constituted classes distinguished by rights. Anciently the term tribe was used extensively in reference to the Teutonic peoples, and different divisions of them are mentioned in history as the Germanic tribes. In American history we have characteristic examples of tribal organization. For instance, the Seneca tribe was constituted of eight totem kins. Historians usually term the five tribes of the Iroquois as the Five Nations and refer to any federation of clans under the general term of tribe.

TRIBUNE (trĭb'ūn), an officer of the ancient Romans, whose duty was to preside over a tribe for the purpose of administration, or to represent it in some official capacity. Originally a tribune represented or stood at the head of each of the three patrician tribes, the *Ramnenses,* the *Titienses,* and the *Luceres,* which originally included the entire body of Roman citizens. Later the term came to have a wider signification. The plebeian tribunes defended their order against the patrician magistrates, and subsequently from three to six military tribunes with consular powers were elected annually. Another class of officers were the military tribunes, who were above the centurions and directly under the commander in chief. Each legion had six such tribunes. During the time of the kingdom they were appointed by the king, but the consuls exercised this power in the republic. During the later portion of the republic they were elected by the people in the assembly of the tribes.

TRICHINA (trĭ-kī'nà), a minute spiral flesh worm discovered in 1835 by Sir James Paget. It is parasitic in the sexually matured



TRICHINAE.

a, Male trichina; *b,* Female trichina; *B,* Heads of the worms; *c, d,* Trichinae in the flesh.

stage in the small intestine and in the larval stage in the voluntary muscles of man, swine, and other mammals. The worm in the larval

stage measures about one-seventy-eighth of an inch in length and one-two-hundredths in breadth. It is scarcely visible to the naked eye. In the mature stage the male is about one-eighteenth and the female one-eighth of an inch long. The female produces large numbers of embryos in the small intestine, whence they bore their way through the intestinal wall and pass into the muscles of the body, where they surround themselves by a cyst, which afterward becomes calcareous. The larva may remain encysted for ten or more years and undergoes further development only when the infected flesh is eaten by a suitable host, when the sexually mature stage is attained in the alimentary canal. Trichinae can enter the human system only by insufficiently cooked flesh, and, being swallowed alive, they soon develop to maturity and multiply in great numbers. Persons infected in this manner have swellings of the face and limbs, which are accompanied by a fever, and death results if aggravated cases are not treated promptly. The flesh of swine is the most prolific source of infection to man. Other animals frequently infected include rats, dogs, rabbits, mice, badgers, and moles.

TRICHINIASIS (trĭk-ĭ-nī'ă-sĭs), or **Trichinosis,** the disease caused by the presence of trichinae in the muscles and intestinal canal. In mankind it is due chiefly to eating the flesh of swine in which these small worms are found. They become liberated soon after the meat is swallowed and multiply very rapidly. Among the symptoms are fever, muscular pains, and others that resemble those common to typhoid fever. Since great danger attends the affliction, a physician should be consulted immediately, else death may result. Castor oil or calomel are prescribed in the early stage to expel the embryos from the stomach and intestines. Frequently the disease appears as an epidemic. It sometimes merges into acute fever, rheumatism, or pneumonia.

TRICOLOR (trī'kŭl-ĕr), the national banner of France, which consists of blue, white, and red colors running in a direction parallel to the flagstaff. The sections are equal in size and the colors are arranged in the order named, the blue being next the staff. Sometimes the name is applied to the national banner of Germany, which is that of the ancient empire, being black, red, and gold.

TRICYCLE (trī'sĭ-k'l), a velocipede with three wheels, introduced for general use in 1876. Many varieties of this vehicle have been placed on the market, but it has not proved a success, except for use by children as a toy and for invalids and others who are unable to walk. In most tricycles the power is applied by the feet through a crank axle, which is connected by a chain with the driving axle. In most designs the rider sits near the two hind wheels, which are worked by the driving axle, and a smaller front wheel is provided to maintain position.

TRIER (trēr), or **Treves,** a city of Germany, in the Rhine province of Prussia, on the Moselle River, 68 miles southwest of Coblenz. It has extensive steam railroads and electric railway facilities. The surrounding country contains extensive gardens, vineyards, and tracts of woods. The Porta Nigra, a fortified gate with lofty towers, is an ancient Roman relic. Among the principal buildings are the cathedral, the municipal library of 125,000 volumes, the city hall, and the Gothic Church known as the Liebfrauenkirche. It has a beautiful public square, near which are the ruins of a Roman palace. The library contains the illuminated Codex Egberti and a copy of the Gutenberg Bible, which was published in 1450. Trier is a commercial and manufacturing center of considerable importance. Among the chief products are musical instruments, glass, furniture, leather, soap, ironware, and machinery. It has a large trade in fruit and grain. Lead, tin, and copper mines are worked in the vicinity.

Trier is considered one of the oldest cities of Germany. Anciently it was called *Augusta Trevirorun,* when it was a Roman colony. In the 5th century it was captured by the French, but was permanently united with Germany in the following century. The Congress of Vienna made it a part of Prussia in 1815. Population, 1922, 46,709.

TRIEST (trē-ĕst'), or **Trieste,** a seaport city of Italy, on the Gulf of Triest, an inlet from the Adriatic Sea, 70 miles northeast of Venice. The city has a fine harbor and ample railroad facilities. It is the center of a large interior and foreign trade. Among the principal buildings is an ancient cathedral in the Byzantine style. Others of note include the municipal buildings, the museum of antiquities, the Cathedral of San Guiesto, the public library, the Capuchin convent, and the university. The streets of the newer part of the city are broad and handsome, but some of the older streets are narrow and poorly paved. It has gas and electric lighting, street railways, waterworks, public parks, and municipal baths. Among the leading manufactures are leather, white lead, ships, soap, cordage, cotton and woolen goods, clothing, and machinery. It has a large trade in wine, fruit, grain, coal, tobacco, and merchandise. The offices of the Austrian Lloyd's shipping company are the most extensive establishments of the kind in Europe. Tergeste was the ancient name and in the time of the Romans the city rose to commercial importance. It has belonged to Italy since 1919. A large proportion of the people are Germans, but the inhabitants include numerous Greeks, Jews, Italians, and Dalmatians. Population, 1920, 229,475.

TRIGONOMETRY (trĭg-ō-nŏm'ē-trў), the science which treats of the relations between the six parts of a plane triangle, these being the three sides and the three angles, so that when three of these parts are known the other three

may be computed. Although geometry treats of this subject, the geometrical methods are purely graphical and cannot be used to obtain accurate numerical results. In nearly all applications of trigonometry the practical object is to measure indirectly some height or some distance of which the direct measurement would be inconvenient or impossible. The principles of trigonometry are employed very extensively by the astronomer and the civil engineer, hence most treatises on the subject include a consideration of navigation, surveying, and spherical astronomy. Trigonometry is divided into plane trigonometry, spherical trigonometry, and analytical trigonometry. *Plane trigonometry* treats of plane angles; *spherical trigonometry,* of spherical triangles; and *analytical trigonometry,* of trigonometric functions.

TRINIDAD (trĭn-ĭ-dăd′), a city in Colorado, county seat of Las Animas County, on the Las Animas River, ninety miles south of Pueblo. Communication is furnished by the Colorado and Southern, the Denver and Rio Grande, and the Atchison, Topeka and Santa Fé railroads. It is surrounded by a farming and grazing country, which contains large deposits of bituminous coal. Its principal buildings include the county courthouse, the high school, the public library, the Saint Raphael's Hospital, and the Saint Joseph's Academy. Among the industries are coking ovens, brickyards, and railroad machine shops. It has public waterworks, sanitary sewerage, and a large trade in coal and merchandise. Population, 1900, 5,345; in 1920, 11,240.

TRINIDAD, an island off the northern coast of South America, forming with Tobago a possession of Great Britain. Trinidad is separated from Venezuela by the Gulf of Paria and is the most southern of the Windward Islands. It is 54 miles long and 40 miles wide. The area is 1,754 square miles. Tobago is situated northeast of Trinidad. The climate is healthful, especially in the more elevated regions. The soil is mostly fertile, though in the northern part of Trinidad are a number of mountain groups. Fine forests prevail in both the islands. Among the chief productions are sugar, molasses, rum, timber, tobacco, pitch, coffee, cotton, and many varieties of fruits. Fish and aquatic birds are abundant. Horses, cattle, sheep, and poultry are reared. A lake of Trinidad is remarkable for its extensive supply of pitch, the annual product of asphalt from this lake being about 190,000 tons. The Caroni River is the principal stream of Trinidad. Port of Spain is the chief town and capital. The colony has about 100 miles of railroads, 1,000 miles of telegraph lines, and about 800 miles of telephones. It has annual exports valued at $10,100,000 and imports estimated at $11,125,000. The island was discovered by Columbus, in 1498, and Trinidad was so named because he saw from the masts of his ship three mountain summits. It became a British possession in 1783. Population, 1916, 341,418.

TRINITY (trĭn′ĭ-tȳ), a river of Texas, formed near Dallas by two forks, known as the East Fork and the West Fork, which rise in the northern part of the State. It has a general course toward the southeast and flows into Galveston Bay, 40 miles north of the city of Galveston. The total length is 550 miles. It is navigable for large boats to Liberty, about 22 miles, and for small craft for 300 miles. The Trinity flows through a fertile section of country.

TRINITY, Doctrine of the, the Christian doctrine that three persons constitute the divine nature, the Father, the Son, and the Holy Ghost. See **God.**

TRINITY SUNDAY, the eighth Sunday after Easter, immediately following Whitsunday. It is celebrated as a festival in honor of the Trinity, hence the name. Pope John XXII. established the festival in 1320 and it is celebrated as such by both the Roman Catholic and the Protestant churches, but not by the Greek Church. All the Sundays between Trinity and Advent are termed Sundays after Trinity, while most of the festivals occur in the half year between Advent Sunday and Trinity. No such festival as Trinity Sunday was known to the early Christians.

TRIO (trī′ō), in music, a composition for three voices or instruments, one of the parts of which must make the third with the bass and the other with the fifth octave. The name *piano trio* is applied to a composition written for the piano, 'cello, and violin, and the term *string trio* has reference to one written for the violin, viola, and 'cello, or two violins and a 'cello. In a minuet the term trio signifies the passage, formerly called the *menuetto,* which alternates with the minuet proper.

TRIPLE ALLIANCE, the name applied to several treaties of European nations. Among these may be mentioned the league formed in 1668 by Sweden, England, and the Netherlands as a means of protecting the Spanish Netherlands against Louis XIV. of France. A triple alliance was concluded by England, France, and the Netherlands in 1717 against Spain and the Pretenders. The *Dreibund,* a league of Germany, Austria, and Italy, was formed in 1882 as a successor to the Dual Alliance between Austria and Germany. It had for its purpose mutual protection in case of attack by other powers.

TRIPLER, Charles E., scientist, born in New York, Aug. 10, 1849; died June 20, 1906. He studied in the public schools and developed an early aptitude for the sciences. Subsequently he gave much attention to the study of gases and for many years conducted special experiments at his private laboratory in New York City. His most noted discoveries and inventions relate to liquid air (q. v.). Many of his devices are in successful use. He organized a company with a capital of $10,000,000 to practically apply his discoveries, but in 1901 a decision of the United States patent office gave Carl Linde, of Munich, Germany,

prior rights to the invention of the self-intensifying process of making liquid air. His claims were based on patents issued in 1897, while Linde's patent was issued two years earlier.

TRIPOLI (trĭp'ō-lĭ), or **Tarabulus**, a seaport of Asiatic Turkey, on the eastern shore of the Mediterranean, 45 miles northeast of Beyrout and 70 miles northwest of Damascus. It is situated in a fertile plain of Syria and most of the structures are of stone. The chief buildings include several mosques, a hospital, and a number of schools. It has a large export trade in silk, oil, cereals, sponges, and tobacco. Off the coast are valuable fisheries of sponges. Tripoli was known as Tripolis in ancient times. In its vicinity are ruins dating from the time of the Crusaders. Population, 1922, 31,500.

TRIPOLI, a seaport city of North Africa, capital of the vilayet of Tripoli, almost due south of the Island of Sicily. It occupies a rocky prominence projecting into the Mediterranean. Surrounding it are fine orchards of lemons, oranges, apricots, and other fruits. The city is defended by high walls and several fortresses. It contains numerous synagogues, mosques, churches, and several government buildings. The manufactures include carpets, leather, silk and woolen textiles, jewelry, and utensils. Numerous caravans start at Tripoli, penetrating through the Sahara and Soudan as far as Timbuctoo, Lake Tchad and Bornu. Most of the business interests are in the hands of Jews and Christians, though a majority of the people are Arabic and Turkish Mohammedans. Tripoli has a triumphal arch erected in 164 A. D. in honor of Marcus Aurelius. Population, 1922, 38,480.

TRIPOLI, a country of North Africa, lying south of the Mediterranean Sea, between Tunis and Egypt, and extending into the Sahara Desert. The coast line is 900 miles long, and the principal indentation is the Gulf of Sidra. Tripoli is a vilayet, or province, of Turkey. It is divided into the four governments of Fezzan, Khoms, Barca (the mutessarriflik of Bengazi), and Jabel-el-Sharb, with a total area of 410,000 square miles. The coast region is the most fertile, especially a belt about twenty miles wide. Parallel to the coast are ranges of the Atlas Mountains, which reach a height of 2,500 to 4,025 feet above sea level, thus preventing copious rains in the interior, which is largely arid. The southern part is a vast desert tract in which rain seldom falls, vegetation depending wholly upon heavy dews that prevail.

Agriculture and stock raising are the principal industries. The productions in the coast region include cotton, wine, grain, grasses, ostrich feathers, and many varieties of tropical fruits. Those of the interior embrace ivory, skins, and various minerals. It has considerable interests in fruit culture. Off the coast are productive fisheries of sponges, pearls, sturgeon, and haddock. Sheep and cattle are reared in large numbers on the interior grazing land, and horses of excellent quality are grown by Bedouin herders. The culture of silk and the mulberry tree engages many people. The principal exports include grain, fruit, and live stock, and the leading imports embrace wines, tea, and manufactured articles.

The government of Tripoli is administered under a governor general, who receives his appointment from the Sultan of Turkey. It may be classed as a despotic government, although it has had a form of constitution since 1909. The people pay as tribute a tenth of all the products of the soil, though there is a special tax on cattle, camels, sheep, and olive trees. However, formerly the revenues were derived principally from prizes captured by the corsairs and the ransoms secured for captives. Anciently Tripoli belonged to Cyrenaica and it still has some ruins at Cyrene, Leptis, and Ptolemais which date from the time of ancient prosperity. Subsequently the Carthaginians came in possession of the country and later it was occupied by the Romans. It became Mohammedan under the Arabs after the decline of Rome. In 1552 it became a possession of Turkey, but was annexed by proclamation to Italy in 1911. Tripoli is the capital and largest city. Cyrene, Derna, and Benghazi are trade centers. Population, 1922, 785,450.

TRIPOLITE (trĭp'ō-līt), or **Tripoli**, the name of an earthy substance, arising from the decay of schists and impure limestone, so called from being procured originally from Tripoli in Africa. It consists almost entirely of silica and is composed largely of the mineral remains of infusoria. The color is white or yellowish-gray and it is granular but not compact. This product is widely distributed, but is procured chiefly from Missouri, France, and Germany. It is used in polishing and in building water filters.

TRIREME (trī'rēm), a vessel or galley used by the ancients, especially the Greeks, Carthaginians, and Romans. It was the largest vessel employed, containing three benches of oars on each side and carrying large square sails to be raised in a fair wind, though sails were not employed while the vessel was in action. A trierarch commanded the vessel, which was often manned by 200 men, who were able to move it with considerable swiftness. In engagements it was made an object to run up suddenly against the vessels of the enemy to disable a large number of oars, or to crush in one of the sides. Where two vessels were unequally equipped, the stronger made it an object to sail alongside the opponent and overcome the crew by personal contact. In later years galleys with five benches of oars took the place of the trireme.

TRITON (trī'tŏn), in Greek mythology, the only son of Poseidon, who is described as one of the minor sea gods. He was represented as an attendant of his father, usually mounted

on a sea monster, and holding in his hand a conch-shell trumpet, with which he soothed the turbulent waves. His home was in the golden palace of his father beneath the Aegean Sea, and he found favorite pastime in riding over the billows of the deep. The Tritons, a class of sea gods, were the offspring of Triton.

TRITON.

TRITON, a genus of water salamanders, which are widely distributed in temperate and subtropical regions. They are found in large numbers, both as water and land animals, in the warmer sections of North America. The front feet have four toes and the hind feet have five, and the body is covered with warty tubercles. The *spotted triton* is a familiar species in the Atlantic states. It is about five inches long, has a brownish-green color, and is more or less spotted with various markings. It is a water animal, but can live on the land for a short period. The feet serve to creep on land and to balance itself while submerged, the forward movement in water being effected by means of the tail. It occurs from New Brunswick to Georgia, and is a favorite and interesting animal for the fresh-water aquarium. The *water newt,* or *crested triton,* of Western Europe is somewhat larger, being nearly seven inches long, but is closely allied. The *great triton,* or *conch,* belongs to this order of animals. It is a gasteropod mollusk of the *Murex* family. Its shell is used by Australian and Polynesian natives as a trumpet. About 100 more or less closely allied species of tritons are now living. Fully 45 fossil species have been described.

TRIUMPH (trī'ŭmf), the name of a solemn procession in ancient Rome, constituting the highest public honor bestowed upon a commander who achieved great successes in warfare. The pageant was led by the senate and the spoils and prisoners, after which came the victorious general or naval commander in a vehicle drawn by four horses, and the rear was brought up by the army of the victor. The procession extended along the Sacred Way to the Temple of Capitoline Jove, where sacrifices were solemnly offered to Jupiter. A naval triumph was usually smaller than one celebrated for a military commander and the festivities were characterized by nautical trophies. The triumph was concluded by an extended season of banquets and entertainments. It was customary to bring captives, especially hostile chiefs, to the pageant, and they were usually put to death during the triumphal march. The last triumph was celebrated in 302 A. D. by Diocletian.

TRIUMVIRATE (trī-ŭm'vĭ-rāt), a Latin word meaning composed of three, applied among the Romans to an office filled by three men. Officials belonging to the triumvirate were called *triumvirs,* and their duties were to jointly execute the obligations incumbent upon public officers. The two great coalitions formed of the three most powerful individuals in the Roman Empire included the triumvirate of Julius Caesar, Crassus, and Pompey, in 60 B. C., and that of Octavius, Antony, and Lepidus, in 43 B. C. The former was never formally recognized. It was broken by the defeat of Crassus in Mesopotamia and the Civil War soon after caused the death of Pompey, resulting in the succession of Julius Caesar as perpetual dictator. The triumvirate formed in 43 B. C., though usually called the second, was in reality the first to receive official recognition. Under it the empire was divided, Lepidus receiving Italy, Octavius the West, and Antony the East. In 1849 Saffi, Mazzini, and Armellini formed a triumvirate at Rome, assuming entire executive power.

TROGLODYTE (trŏg'lō-dīt), the name given to a race of cave dwellers in ancient Greece, and later the term was applied similarly in other countries. These people were uncivilized and their dwellings were constructed in natural caverns or in caves dug in bluffs or hillsides. Strabo mentions people of this class in connection with the history of the Caucasus and the southern part of Egypt. It is asserted that they did not possess the art of speech, but uttered shrieks and screams similar to those of the lower animals. They were pastoral, practiced polygamy, and put the aged and infirm to death.

TROGON (trō'gŏn), a genus of birds found in the warmer climates of both hemispheres. The bill is short and strong, the wings are moderate and rounded, and the legs and feet are rather weak. These birds have a richly colored plumage, usually metallic green above and red below, and some species have remarkably long tails. Of the fifty species enumerated, more than half are found in America. They subsist largely on fruits, berries, and insects and build their nests in the cavity of decayed trees. The voice is loud and unpleasant and some utter clucking and whistling notes. See illustration on following page.

TROJAN WAR (trō'jan). See **Troy; Homer.**

TROLLING (trōl'lĭng), a favorite method of angling to catch various kinds of fish. The lure is in the form of a spoon bait and is so attached to a line that it spins as it is drawn through the water, which is made possible by the use of a swivel. The bluefish and several other fish are taken from a boat in motion, and some species are caught by throwing the lines so as to be carried by the current of tides or the flowing water in streams. Among the fish

caught successfully by trolling are the pickerel, mackerel, tarpon, tuna, bass, and bluefish.

TROLLOPE (trŏl'lŭp), **Anthony,** novelist, born in London, England, April 24, 1815; died Dec. 6, 1882. He was a son of Frances M. Trollope (1780-1863), an English authoress, studied at Harrow and Winchester, and in 1834 became a clerk in the British postal service. This position he held for 33 years, but in the meantime gave considerable attention to study and engaged in literature. He visited Australia, Canada, the United States, and the West Indies in connection with the postal service and in 1867 resigned from public office. The first writings of Trollope were published in 1847, entitled "Kellys and the O'Kelleys." He assisted in establishing the *Fortnightly Review* in 1865 and subsequent to 1867 served as editor of the *Saint Paul Magazine.* Among his most noteworthy writings are "Life of Cicero," "West Indies and the Spanish Main," "The Bertrams," "Castle Richmond," "Golden Lion of Granpère," "Way We Live Now," "Ralph the Heir," "Marion Fay," "Framley Parsonage," "Last Chronicles of Barset," "North America," "Phineas Finn, the Irish Member," and "Traveling Sketches."

TROGON.

TROLLS, the name applied in Scandinavian mythology to various supernatural beings. It sometimes refers to misshapen dwarfs and in other cases to giants. Trolls were looked upon as powerful and hostile to man, but were considered very stupid. Their stupidity made it possible to defeat them without difficulty, but great danger attended those who fell into their hands.

TROMBONE (trŏm'bōn), a large instrument of the trumpet kind, having a deep and loud tone. It is one of the wind instruments possessing a complete chromatic scale, like the human voice or violin, and is considered a very valuable addition to the orchestra. The form generally used has a long tube bent twice upon itself and fitted at the outer bend with a U-shaped slide, by the motion of which the length of the vibrating air column may be adjusted so as to form any note within its compass. Three kinds of trombones are in general use, called after their pitch the *alto, tenor,* and *bass* trombones. Some instruments are fitted with pistons, when they are known as *valve trombones.*

TROMP (trŏmp), **Martin Harpertzoon van,** famous admiral, born at Brielle, Holland, in 1597; slain July 31, 1653. His father was a commander in the navy of Holland. The son went with his father to the East Indies in a merchantman in 1605, where both were captured and held as prisoners by the English for several years. He escaped to Holland, joined the navy in 1624, and soon after became lieutenant admiral. In 1639 he surprised and completely destroyed a Spanish fleet near Gravelines, off the coast of Holland, and was soon after made admiral. He was defeated by an English fleet under Admiral Blake on May 19, 1652, but on Nov. 29 of the same year he defeated the latter in the Strait of Dover, and sailed up the channel without meeting material resistance. In 1653 another battle occurred, which lasted three days without decisive results, but Tromp was defeated with a loss of seventeen vessels in June of the same year. On July 31, 1653, a decisive battle occurred off the coast of Holland, in which the Dutch lost thirty vessels and Admiral Tromp was killed by a musket bullet. His son, Cornelius Tromp (1629-1691), was a famous admiral of Holland. He and De Ruyter defeated the English fleet in 1666. Later he demonstrated remarkable ability in commanding against the allied fleet of France and England. Charles II. of England made him a baron in 1675, and he was subsequently lieutenant admiral of the United Provinces.

TRONDHJEM (trŏn'yĕm), a city of Norway, at the mouth of the Nid River, 240 miles north of Christiania. It is situated on the south shore of Trondhjem Fjord, which is open for navigation the entire year, and has railroad facilities to points in Norway and Sweden. The streets are well improved and regularly platted. It has systems of waterworks, sewerage, and electric lighting. The chief buildings include the public library, the Lutheran Cathedral, and several institutions of learning. The public library has 110,000 volumes and with it is connected a museum of natural history. Among

the manufactures are paper, sugar, machinery, snuff and cigars, canned and cured fish, and sailing vessels. It has a large export trade in timber, minerals, and fish. The city was founded in 996 and was long known as Nidaros. Population, 1920, 45,228.

TROPHY (trō'fy), a memorial erected on a field of battle to commemorate the deeds of valor of the victorious party. Trophies were erected by the Greeks and Romans. They consisted largely of the arms of slain enemies, placed either upon a stone or metal pillar. The Romans, to make their trophies inviolable, consecrated them to Jupiter or some other deity. Trophies were allowed to perish by natural causes, since it was desired that hostile feelings should not be perpetuated, and any attempt to repair them when decayed was regarded as sacrilegious. Trophies have been erected in many modern churches and other buildings. These are usually carved in stone or bronze, and commemorate heroism and valued service.

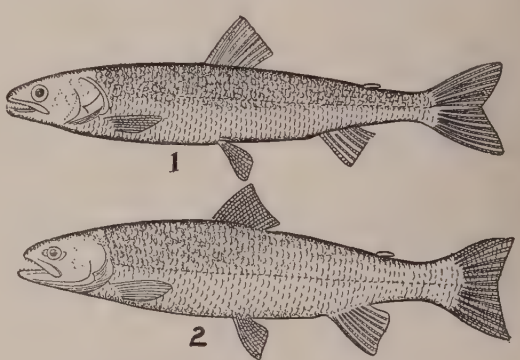
TROPIC BIRD, a class of sea birds of the pelican family, having webbed feet, two elongated tail feathers, and a strong bill. They are able to fly with considerable facility and are seen quite frequently on the wing, being birds of powerful flight. Two well-known species are common to the Atlantic, Indian, and Pacific oceans. The *common tropic bird* is about thirty inches long, with an alar extent of forty inches.

TROPICS (trŏp'ĭks), two small circles imagined drawn parallel to the Equator, situated about 23° 27′ north and south of it. They serve to indicate the region at which the sun is seen in the zenith on the days of its greatest declination, and between them are included all the points on which the sun's rays fall vertically at any season of the year. The tropic north of the Equator is called the *Tropic of Cancer,* since the sun is in the constellation of Cancer when shining directly upon it, and the one south of the Equator is called the *Tropic of Capricorn,* because the sun, when shining directly upon it, is in the constellation of Capricorn. Between the two tropics lies the Torrid, or Hot, Zone, the climate of which is said to be *tropical.* The width of the Torrid Zone is 47° and north and south of it are the North and South Temperate zones, respectively. Animals and plants are larger and include more species than in any other zone, birds are more numerous and of gayer plumage, and the sea shells are brighter than in lands where the sun shines with less power.

TROTZKY, Leon, public man, born in Russia in 1877. In 1905 he was sent to Siberia as an offensive socialist and after his release, in 1912, he established a revolutionary newspaper in Berlin and later in Paris. He began to publish *The New Word,* a Russian paper, in New York, but returned to Russia when Czar Nicholas was overthrown, where he supported Nikolai Lenine.

TROUBADOUR (trōō'bà-dōōr), the name given to a class of poets which appeared in Provence, in the south of France, near the close of the 11th century, but later spread to Spain and Italy. They engaged in the production of lyrical poetry, chiefly of the kind complicated in meter and rhymes, and devoted themselves to the musical art rather for the love of it than to secure monetary profit. The art of the troubadours came to be called the *gay science.* It is supposed to have been brought from the East by the Spaniards, of whom the French of Provence learned it and afterward gave it higher development. They became popular at the courts of kings and nobles, whose deeds they praised or censured in songs, though they more frequently sang of fancy and love on subjects selected by some lady. In many cases the poems were devoted to the evils of the times, subjects of gallantry, conditions of society, and skill in military arts. The period in which they flourished was from 1085 until 1290, about 200 years.

TROUT, the name of many species of fish belonging to the salmon family, abundant in almost all the rivers and lakes of the tem-



1. Speckled Trout; 2, Dolly Varden Trout.

perate and colder zones. They are excellent food fishes, but differ from the salmon proper in that they frequent only bodies of fresh water. The *brook,* or *speckled, trout* is common to the Northern States and Canada and is one of the favorite food fishes. It weighs one to two pounds, is six to twenty-six inches long, and has a brown or yellowish color with spots of red and black. Other American species include the *lake trout, mountain trout, Dolly Varden trout, blue-black trout, golden trout, salmon trout,* and *Mackinaw trout.* Several American species have been introduced to Europe, and the *common river trout* of Europe has been successfully planted in Canada and the United States. Trout fishing is a favorite sport, since they are very voracious and readily take any kind of animal bait, especially worms and flies. The color of the trout varies somewhat according to the condition of the water and the flesh ranges from white to pink, the latter being most highly prized. Several species attain a large

size. Specimens weighing from 25 to 40 pounds are not rare.

TROUVÈRE (trōō-vâr'), the name given to a class of ancient poets in France, corresponding to the Provençal troubadour. They composed a large part of the courtly lyrics of medieval France. The trouvères are distinct from the *jongleurs,* who were the class that performed the works composed by the trouvères, but some of the jongleurs aspired to composition. Most of the trouvères were men of rank and standing, such as priests or knights, and their compositions were largely epic or narrative in character.

TROWBRIDGE (trō'brĭj), **John Townsend,** novelist, born in Ogden, N. Y., Sept. 18, 1827. He attended the public schools and fitted himself for public school teaching, but in 1846 removed to New York and engaged in magazine and newspaper writing. In 1850 he became editor of *The Yankee Nation* and was assistant editor of *Our Young Folks* from 1870 to 1873. His published works are very numerous and many of his stories have been immensely popular owing to their interesting style. His first novels were written under the pseudonym of *Paul Creyton.* Among his writings are "Hearts and Faces," "Old Battle Ground," "Three Scouts," "Story of Columbus," "Bound in Honor," "His Own Master," "Scarlet Tanager," "Coupon Bonds," "The Vagabonds, and Other Poems," "Silver Medal Series," "Lawrence's Adventures Among the Ice-Cutters," "Biding His Time," "The Lottery Ticket," and "Cudjo's Cave." The last mentioned had the most extensive sale of any of his books. He contributed to the *Atlantic Monthly* for several years. He died Feb. 12, 1916.

TROY, or Ilium, a famous city of Asia Minor. It is celebrated as the seat of the Trojan War, the chief events of which are recounted in the *Iliad,* written by Homer. The ancient city is supposed to have occupied an imposing site in the northwestern part of Asia Minor, near the Aegean Sea and the western extremity of the Hellespont. We learn from the *Iliad* that the city was situated at the foot of Mount Ida and that between it and the sea was the plain of Troy, a stretch of land about nine miles wide. It is believed that the plain referred to is a scope of land lying near the mouth of the Mendereh River, now supposed to be the Scamander of Homer. Schliemann made excavations in this vicinity and discovered remains of a prehistoric city, believed to be ruins dating from the ancient Troy.

Homer relates that Troy reached its greatest splendor in the reign of King Priam, but its destruction was caused by Paris, a son of Priam, abducting Helen, wife of Menelaus, King of Sparta, and carrying her to the Trojan capital. The Greeks spent ten years in collecting an army to avenge this outrage, and, under the leadership of Agamemnon, who had 1,186 ships and 100,000 men, drove the Trojans within the walls of Troy, where they conducted a siege for ten years. A quarrel between Achilles and Agamemnon proved disastrous to the Greeks in the beginning of the tenth year, and this is the special subject of the *Iliad.*

HEROES OF THE TROJAN WAR

MENELAUS. PARIS. DIOMEDES. ULYSSES. NESTOR. ACHILLES. AGAMEMNON.

It is related that the Greeks were unable to capture the city by direct assault. Hence, they constructed a huge wooden horse, within which they concealed a band of the bravest Greek heroes. The Greeks left this structure before the gates of Troy, withdrew from the city, and the army and navy sailed to an island near the coast called Tenedos. Much rejoicing was occasioned in the city at the departure of the Greeks, and it was proposed that the wooden horse be drawn within the walls. However, Laocoön warned the Trojans not to bring any device made by the Greeks into the city and while speaking cast his spear against the wooden horse. Soon a monstrous serpent rose from the sea and devoured Laocoön and his sons,

thus leading the people to believe that destruction had visited his home because he had cast his spear against an object sacred to Minerva. They accordingly brought the horse within the gates by means of ropes and rollers, but at night a secret door was opened and the brave band of Greeks concealed within, aided by the Greek army, returned from the island, captured and destroyed the city. It is thought that this event occurred in 1184 B. C. Among the bravest Grecians who took part in the memorable siege were Achilles, Agamemnon, Ajax, Ulysses, Menelaus, Diomedes, Nestor, and Patroclus. The celebrated Trojans included Hector. Sarpedon, and Aeneas. It is supposed that Aeolic Greeks founded a city on the site of Troy in 700 B. C., known as Ilium, though this, as well as the Homeric account of the fall of Troy, is doubtful.

TROY, a city of Alabama, county seat of Pike County, 52 miles southeast of Montgomery. It is on the Central of Georgia and the Atlantic Coast railroads and has a large shipping trade in cotton and produce. The public utilities include waterworks and electric lighting. Among the noteworthy buildings are the county courthouse, the high school, and the State normal school. It has manufactures of earthenware, tobacco products, and machinery. The first settlement on its site was made in 1843, in which year it was incorporated. Population, 1920, 5,696.

TROY, a city of New York, county seat of Rensselaer County, on the Hudson River, six miles north of Albany. It is at the head of steam navigation, on the Boston and Maine, the New York Central, and the Delaware and Hudson railroads. Communication is likewise furnished by the Barge and Champlain canals. The river is crossed by a number of substantial railway and wagon bridges. Transportation within the city is provided by a system of electric railways, which are connected with lines that extend to Albany and other cities. Many of the streets are substantially paved with stone and macadam. They are well drained by a system of sewers and lighted with gas and electricity. The waterworks are owned by the municipality.

Troy is finely located on a rolling site, being level near the river and rising over a range of hills toward the east. Mount Ida is the highest elevation within the limits. Beman Park is one of many public resorts. Other public grounds include Lagoon Island, in the Hudson south of the city, and Warren's Hill Park, which overlooks the river. Washington Square contains the soldiers' and sailors' monument and a number of fine memorials are in Oakwood Cemetery, a burial ground of great beauty. This cemetery contains the remains of Gen. George H. Thomas and the Earl Memorial Chapel, a modern crematory. The residential section is beautifully improved with lawns and avenues of trees.

Troy has many substantial buildings of modern construction. These include the county courthouse, the post office, the city hall, the Hart Memorial building, the Union Passenger Station, the Hendrick Hudson Hotel, the Row Memorial building, and the Savings Bank building. The system of public schools is well organized and culminates in an advanced high school course. Among the educational institutions are the Emma Willard Seminary and the Rensselaer Polytechnic Institute, an important institution. It is the seat of the Troy Hospital, the La Salle Institute, and many charitable and benevolent institutions. The ecclesiastical buildings include the First Presbyterian, the Saint Paul's, the Saint Peter's, the Second Presbyterian, the Saint Mary's, the Saint John's, and a number of other churches. Several fine libraries are maintained, including the collections in the public library and in the Rensselaer Polytechnic Institute.

The city ranks fifth as a manufacturing center in the State. It has extensive water power facilities on the Hudson, owing to the extensive dam maintained by the State. The chief manufacturing enterprises include iron and steel works, paper and pulp mills, canneries, brick and tile yards, and flouring and grist mills. Among the general manufactures are clothing, hosiery and knit goods, scientific instruments, furnaces, bells and laundry machinery. A large wholesaling and jobbing trade is carried on with points in New York and New England. It has an extensive trade in cereals, manufactures, live stock, dairy products, and fruits.

The region with which Troy is included was a part of the grant of land to Van Rensselaer in 1629. Settlements began to be made soon after, but the town was not platted until 1787. It was first called Van der Heyden's Ferry, from an owner of the immediate tract upon which the town was built, and the present name was adopted in 1789. Its charter as a city dates from 1816. At the time of the War of 1812 it contained the large packing establishment of Samuel Wilson, who furnished the army with packed meat in barrels. He was familiarly called "Uncle Sam," which circumstance gave rise to the popular national nickname applied to the United States. Lansingburg, a village with a population of 12,597, was annexed to Troy in 1901. Population, 1905, 76,861; in 1925, 72,223.

TROY, a city of Ohio, county seat of Miami County, twenty miles north of Dayton. It is on the Cleveland, Cincinnati, Chicago and Saint Louis and the Baltimore and Ohio railways. Transportation facilities are provided by several electric railway lines. The surrounding country is devoted to agriculture and stock raising. Among the chief buildings are the high school, the county courthouse, and many churches. The manufactures include wagons, tile, bread, flour, earthenware, and

machinery. It has waterworks and an electric lighting and power plant. Population, 1900, 5,881; in 1920, 7,260.

TROYES (trwä), a city in France, capital of the department of Aube, 98 miles southeast of Paris. It is on the Seine River and is connected by a number of important railroads with other trade centers. Among the manufactures are cotton and woolen goods, hardware, pottery, soap, paper, and machinery. The surrounding country is fertile, producing fruit, raw silk, and cereals. A Gothic cathedral, dedicated to Saint Peter in 872, occupies an imposing site. It has a public library of 112,000 volumes, numerous churches, a fine museum, and various educational and scientific institutions. Gas and electric lighting, waterworks, pavements, and street railways are among the public improvements. Troyes was long a Roman possession, when it was known as Augustobona. It was the scene of a battle between Napoleon and the allies in 1814. The Germans occupied it in 1870. Population, 1922, 53,447.

TROY WEIGHT, a scale of weights used for weighing silver, gold, and jewelry, so named from Troyes in France. The troy pound is equal to 22.79 cubic inches of distilled water. It contains 12 ounces of 20 pennyweights each, and the pennyweight contains 24 grains. A pound troy is identical with the pound of apothecary's weight, and the ounce and grain of these two weights are correspondingly the same. The weight of the pound compared with the avoirdupois pound is as 144 to 175, and the troy ounce is to the avoirdupois ounce as 192 to 175.

TRUDEAU (trōō-dō'), **Edward Livingston,** physician, born in New York City, Oct. 5, 1848. He studied at Columbia College and the College of Physicians and Surgeons, in New York, and practiced for a brief time in his native city. In 1873 he took up his residence in the Adirondack Mountains, at Saranac Lake, where he founded the Adirondack Cottage Sanitarium for the treatment of tuberculosis. He was the first American to employ the open-air method in treating this disease and was singularly successful in effecting cures among consumptives. Numerous and valuable contributions on this treatment were made by him to medical publications.

TRUE, Alfred Charles, educator, born in Middletown, Conn., June 5, 1853. After attending the public schools, he entered Wesleyan University, where he graduated in 1873, and the same year was made principal of the high school at Essex, N. Y. He became an instructor in the State normal school at Westfield, Mass., in 1875, serving until 1882, and was professor in the Wesleyan University from 1884 until 1888. In the latter year he accepted a position in the United States Department of Agriculture and in 1902 was made dean of the first graduate school of agriculture in the United States, at Columbus, Ohio. Subsequently he was prominent in organizing and conducting agricultural investigations in Hawaii and Porto Rico, and became known as one of the leading students of agricultural education and research of America. He edited the *Experiment Station Record* for ten years. His publications include "Agricultural Experiment Stations in the United States," "Education and Research in Agriculture in the United States," and "Progress in Agricultural Education."

TRUFFLE (trŭ'f'l), a genus of plants belonging to the fungi, several species of which are cultivated as food plants. These plants are subterranean, without visible roots or stems, and grow to the size of a large potato. They are cultivated to a considerable extent in Europe, especially in the southern part, and form an ingredient in many dishes, both for the flavor and their nutritious qualities. Since no stem or other visible growth appears above the surface, the plants are found through the agency of dogs that are trained to hunt them by means of the scent. While truffles may be grown in Canada and the United States, they are little known in this country as an edible food.

TRUMBULL (trŭm'bŭl), **Henry Clay,** author, born in Stonington, Conn., June 8, 1830; died in 1903. He studied in Williston Seminary and in 1858 removed to Hartford to engage in railroad business, but subsequently became Sunday-school missionary for Connecticut. After being ordained a minister in the Congregational Church, he served as chaplain in the war, and in 1865 became secretary of the American Sunday-School Union for New England. In 1875 he removed to Philadelphia, where he published the *Sunday School Times.* He visited Arabia and other countries of the East in 1881. His writings include "Teaching and Teachers," "Studies in Oriental Social Life," "Some Army Sermons," "The Captured Scout of the Army of the James," "Children in the Temple," and "A Model Superintendent."

TRUMBULL, John, painter, born in Lebanon, Conn., June 6, 1756; died in New York City, Nov. 10, 1843. After graduating at Harvard University, in 1773, he studied painting in Boston and subsequently with Benjamin West in London. He was imprisoned while in London, in 1780, owing to the intense excitement prevailing at the time Major André was executed as a spy. His productions include numerous historical scenes in connection with the American Revolution and portraits of leading Americans. He was employed in 1807 to paint a number of subjects for the capitol, these including "The Surrender of Burgoyne," "The Declaration of Independence," "The Surrender of Cornwallis," and "The Resignation of Washington." Another fine historical picture is his "Battle of Bunker Hill." He gave a collection of 58 historical paintings, including a number

of portraits of eminent Americans, to Yale University.

TRUMBULL, Jonathan, jurist and statesman, born in Lebanon, Conn., Oct. 12, 1710; died there Aug. 17, 1785. In 1727 he graduated from Harvard University, and subsequently engaged in the law profession. He was chief justice of Connecticut from 1766 to 1769 and was Governor of the colony from 1769 until 1783. He was one of the earliest among the colonial governors to espouse the American cause, refusing to obligate himself by oath to enforce the Stamp Act, and was a trusted supporter and confidential adviser of Washington, who quite often spoke of him as *Brother Jonathan,* a term since frequently applied as equivalent to the people of the United States. A degree was conferred upon him by Yale in 1779. The University of Edinburgh, Scotland, gave him a degree in 1783.

TRUMBULL, Lyman, jurist and statesman, born in Colchester, Conn., Oct. 12, 1813; died in Chicago, June 25, 1896. He was admitted to the bar in 1837 and in the same year began the practice of law at Belleville, Ill. He was secretary of State for Illinois from 1841 to 1842 and justice of the Illinois supreme court from 1848 until 1853. In 1854 he was chosen a member of Congress as a Democrat and the following year became United States Senator, serving as such until 1873. He differed from Stephen A. Douglas on the question of slavery and in 1861 supported Abraham Lincoln for President, serving in the Senate for five years of his eventful career as a Republican. He was one of the senators who agreed with the reconstruction policy of Andrew Johnson, hence he acted with the Democrats from that time until the close of his political life. Subsequent to his retirement from public life he had a lucrative law practice in Chicago.

TRUMPET (trŭmp'ĕt), a wind musical instrument which dates from remote antiquity, distinguished for its clear and penetrating tone. It is formed of a single tube of brass or silver curved into a convenient shape, having a mouthpiece at one end and a bell at the other. Most modern instruments of this class are provided with crooks and slides, thus raising or lowering the pitch as the tube is shortened or lengthened respectively. The sounds are modified by the action of the player's lips and may be varied by the addition of slides, valves, and keys. It is a popular instrument in military bands, and is used to a considerable extent in war. For ear and speaking trumpet, see **Sound.**

TRUMPET FLOWER, the popular name of several flowering vines, which have a woody stem and bear flowers formed like a trumpet. They are native to the Southern United States, but are now cultivated extensively in gardens and house yards throughout the Northern States and the southern part of Canada, where they are popular as vines designed to climb trellis work and porches. About fifty American species have been enumerated. The trumpet flower is a woody vine. It has an abundance of rootlets and climbs to a great height. The flowers are in clusters, usually of a reddish color, and the leaves are pinnate, with ovate leaflets. A

TRUMPET FLOWER.

species known as the *Tacoma Australis* is an ornamental Australian climber. The *great-flowered trumpet flower* is native to China. Other species are found in Eastern Asia, South America, the West Indies, and Australia.

TRURO (trų'rō), a city of Nova Scotia, capital of Colchester County, on the Salmon River, sixty miles northeast of Halifax. It is near the head of Cobequid Bay, on the Canadian National Railroad, and is surrounded by a fertile agricultural region. The chief buildings include the county courthouse, the high school, the Colchester Academy, the Stanley Hotel, and the Nova Scotia Agricultural College. Among the manufactures are clothing, boots and shoes, flour, leather goods, machinery, and musical instruments. The place was founded in 1761 by loyal settlers from New Hampshire. Population, 1901, 5,993; in 1921 7,562.

TRUSTEE (trŭs-tē'), the term applied to a person to whom is intrusted the right to hold in trust certain property, either real or personal, for the benefit of another, or for some special purpose. Any one who has an interest in property so held, whether the interest be exclusive or limited, is termed a beneficiary. It is not obligatory upon any one to assume the responsibility of a trust, but if he undertakes such a duty it must be discharged until a full settlement is made, or he is released upon the order of a court or an agreement of the beneficiaries. Declarations or creations of trusts or powers in relation to real estate are executed in the same manner as those of conveyance, but

this provision does not apply to trusts resulting from the operation or construction of law. Most states make breach of trusts a crime punishable by law, and in all cases the trustee is liable for the misapplication of funds or the consequences of a breach of trust. If several trustees act conjointly in the administration of a trust, each is liable only for his own acts. See **Trusts.**

TRUSTS, the combinations of corporations or of individuals which are maintained to fix the prices of their products, in part at least, on the principle of monopoly. The term *corporation* is applied to the combination of individuals which are maintained for productive and commercial purposes, but trusts are by no means confined to corporations. However, it may be said that trusts are an outgrowth of associations which seek to control large interests in promoting commerce and industry. Besides the primary object of trusts to diminish the cost of production, they seek to affect the market by limiting the output as well as to make the prices as favorable to the parties who constitute the combination. Those who promote the organization and maintenance of trusts defend them from the industrial point of view that free and open competition is ruinous in its nature, especially where intercourse between persons in different localities is easily carried on and where a large amount of capital is invested in fixed plants. They also argue that there is a material saving industrially where combinations are maintained, and claim that the competitive system tends to lessen the quality of the product as well as to require the investment of larger sums of money to produce a reasonably fair output.

In 1900 the government published a census bulletin in which it was shown that 183 corporations controlled 118 idle and 29,029 active plants. Formerly the greater number of plants involved, such as mills and factories, were operated as independent properties, but the combinations brought these industries under the control of a very few men. As a whole the effect was not beneficial to laboring men and, on the other hand, the public was obliged to pay a somewhat higher price for products turned out by these institutions. In many places were manufacturing establishments that had received aid by local capitalists, some of which were operated by the trusts, but a majority of these remained idle or were converted into plants producing commodities different from those they were established to manufacture. Investigation also developed the fact that prices of products were not dependent so much upon the cost of manufacture as they were upon whether independent plants still continued to operate. As a whole the prices were higher and uniform where the trusts controlled the market, and they were in a few cases below the actual cost of production where competition was maintained, the promoters being desirous of disorganizing or ruining the business of competitive industries.

The Department of Commerce and Labor, established in 1903, includes the Bureau of Corporations. This branch of the government has investigated many of the so-called trusts, such as seek to control the output and price of paper, tobacco, beef, steel and iron, flour, and mineral oil. Oscar L. Straus, in 1908, then Secretary of Commerce and Labor, published the view that reforms and the control of trusts must come through some general system of publicity. In line with this view, the government and many of the states prosecuted many violaters of the anti-trust laws. The prosecutions include those against the International Harvester Company, the American Sugar Refining Company, the American Cigar Company, and the International Paper Company. Many states imposed heavy fines upon trusts, especially Texas, where the Waters-Pierce Oil Company was fined $1,623,900.

A strong tendency to overcapitalize many of the larger trusts has been observed in many instances. This has resulted in the issuance of a large amount of stock which has been sold to the public in prosperous times, but which afterward proved comparatively of little value. The 183 corporations referred to above had an actual capital of $1,458,522,573, but their authorized capitalization was $3,607,539,200, and in addition they issued bonds amounting to $3,085,200,868. Thomas W. Lawson, of Boston, contributed a series of articles to *Everybody's Magazine* in 1905 in which he showed the enormity of overcapitalization of the Standard Oil Company, the Amalgamated Copper Company, the United States Steel Corporation, and other similar organizations doing business on a very large scale, both in the production and sale of commodities and in selling stock of questionable value upon the public. The United States Steel Corporation was incorporated under the laws of New Jersey in 1901 with a capital of $1,100,000,000, absorbing at the time eleven of the largest steel, iron, tin, bridge, wire, and tube companies of the United States.

Many great trusts were organized in spite of the Sherman Anti-Trust Law, the first section of which is as follows:

> Section 1. Every contract, combination in the form of trust, or otherwise, or conspiracy in restraint of trade or commerce among the several states or with foreign nations is hereby declared to be illegal. Every person who shall make any such contract or engage in any such combination or conspiracy shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by fine not exceeding $5,000 or by imprisonment not exceeding one year, or by both said punishments, in the discretion of the court.

TSAD, Tchad, or **Chad** (chäd), a freshwater lake of Central Africa, in the Sudan, immediately north of Kamerun and east of the Royal Niger Territories. It is 150 miles long, 118 wide, and 900 feet above sea level. The area depends upon the season and rainfall, ranging from 10,000 to 20,000 square miles. Several

large rivers flow into it including the Shari and Yaobe. The shores are low and swampy and surrounding it are vast regions that are covered with reeds and papyrus. The general depth ranges from ten to eighteen feet in ordinary seasons, but some years the water is much deeper and covers many of the islands and large tracts of adjacent marshes. The fact that it is a fresh-water lake, although it has no outlet to the sea, is ascribed by some to the circumstance that it sometimes overflows and covers a region lying about 300 miles toward the northeast. The vicinity of Lake Tsad is inhabited by native pagans, who are of an unusually dark color and find employment in cultivating cotton, corn, and vegetables. They rear stock, such as cattle, horses, and sheep. Large numbers of crocodiles, hippopotami, fish, and water fowl are abundant. Several thriving commercial towns are in its vicinity, including Mawo, Kuka, and Massena. Nachtigal (q. v.) explored the lake in 1871 and 1872.

TSARITSYN (tsȧ-rē′tsĭn), a port city of Russia, in the government of Saratov, on the Volga River. It has transportation facilities by railways and navigation on the Volga and is surrounded by a fertile farming and grazing country. The principal buildings include the townhall, grain elevators, the public library, and a large Lutheran Church. Salt, mustard, machinery, and clothing are the principal manufactures. The city has an extensive trade in farm produce, petroleum, fish, and lumber. Population, 1922, 59,678.

TSARSKOYE SELO. See **Tzarskoye.**

TSCHAIKOWSKY (chī-kôf′skĕ), **Peter Ilyitch,** composer, born at Votkinsk, Russia, April 25, 1840; died Nov. 5, 1893. He studied music at the conservatory of Saint Petersburg, after having devoted several years to the study of law, and in 1866 became professor of harmony and musical history in the Conservatory of Moscow. After 1877 he devoted his attention entirely to composition. His products consist of numerous symphonies, operas, solos, and overtures. He made an extensive visit to America in 1875 and again in 1891, when he appeared with much success in the leading cities of Canada and the United States. In response to an invitation of Walter Damrosch he took part in the dedication of Carnegie Hall, New York. His compositions include "The Tempest," "Disappointment," "Why Are the Roses so Pale," and "Romeo and Juliette."

TSETSE (tsĕt′sē), a small blood-sucking fly of South Africa, slightly larger than the gadfly. The color is brown with yellow transverse bars on the abdomen, beyond which the wings project considerably. It is an active insect, especially in the warmer part of the day, and can scarcely be caught by the hand. The bite is as harmless to man as it is to the mule and the wild animals native to the country, but it is decidedly poisonous to oxen, horses, and dogs. No harmful effect is perceived at first, but in a few days the nose and eyes begin to run. This symptom is followed by swelling of the lower jaw, staggering, relaxation of the muscles, and finally death. Some of the animals bitten linger in an affected condition for several months, often recovering when the cases are extended. Livingstone lost 43 oxen by the attack of this pest on one of his journeys. These insects are very numerous in some regions, often attacking horses and cattle in swarms.

TUAREGS (tōō-ä′rĕgz), a nomadic people of the Sahara Desert, closely allied to the Berbers. They inhabit the Sahara from Fezzan west to the Atlantic. The hair is straight, the physique is well developed, and the features resemble those of the Caucasian rather than the African. In religion they are Mohammedan and they are fanatic and warlike. Formerly they were monogamists, but became polygamists after adopting the Moslem faith. The women go unveiled and take part in public affairs. These people number about 300,000.

TUBERCULOSIS (tū-bĕr-kū-lō′sĭs), a disease due to the presence or formation of tubercles within some organ or tissue, as pulmonary tuberculosis and renal tuberculosis. Tubercles are small granular tumors, or nodules, which may be developed in different organs or parts of the body, and range in size from a mere point to an eighth of an inch in diameter. If only a few prevail in any organ, they may remain harmless, but when numerous they form a tubercular mass that tends to spread and destroy the surrounding structure. Dr. Koch (q. v.), in 1882, discovered that they are due to a microscopic organism called the *tubercle bacillus,* which produces a cheesy degeneration of the normal tissue, resulting eventually in tuberculosis. Formerly the disease was considered hereditary, but now it is known to spread only by infection. However, some individuals have a predisposition toward the disease, in which case the system is unable to throw off the infection. Ordinarily it may be produced by any cause which lowers the vital conditions, such as dampness of soil and atmosphere, impure air, bad ventilation, overcrowded rooms, and filthy habits. The chief seat of the disease is in the lungs, brain, kidneys, liver, bronchial tubes, serous membranes, and intestines. It affects the lower animals as well as man. The disease may be transmitted to man by the milk and flesh of tuberculous cattle. However, the sputum of patients affected by the disease is the greatest source of danger, since the bacilli are thrown off in this way in very large numbers. The germ is not killed by drying or ordinary exposure, hence may be taken up in the dust and carried to the lungs of some person by inspiration of air.

Much anxiety has been occasioned by the remarkable prevalence of tuberculosis in large cities, and it is thought that many cases are

due to the consumption of affected meat and to overcrowded tenements. A report published in 1920 shows that 15,417 deaths occurred in 14,480 tenement houses in New York City, and that the deaths due to tuberculosis in Great Britain average annually 70,212. The International Tuberculosis Congress, promoted for the establishment of sanitariums to guard against and treat pulmonary and other forms of tuberculosis, held an important session at Berlin, Germany, May 24-27, 1899. It was attended by delegates from most countries, including Canada and the United States, and did much to call attention to the widespread prevalence of the disease and to the most feasible means to cope with it. Swine, chickens, rabbits, cattle, and other domestic animals are subject to various forms of the disease. In 1888 Albert Landerer, of Stuttgart, Germany, recommended sodium cinnamate as a cure, but it cannot be said to be more than a preventive in some cases. Hospitals for the care of persons affected with tuberculosis have been established in many countries. Dr. Koch originated the specific treatment with tuberculin, which is now used in the examination of individuals, both man and lower animals, that are supposed to be affected. Other treatments include those which employ antitoxins, antitubercle serums, cod-liver oil, and the X-ray. However, every curative method requires an abundance of exercise and life in the open air.

TUBEROSE (tūb′rōz), an ornamental bulbous plant, native to tropical America and Asia, cultivated in gardens for its fragrant white flowers. The branchless stem grows from a bulbous root, usually two to four feet high, and bears sword-shaped leaves. The flowers are beautiful and their pure white color and enduring fragrance make them highly esteemed. Perfumers cultivate tuberoses in Italy, France and Switzerland. The plant is propagated by tubers, which appear at the bottom of the scape. Numerous species have been obtained by propagation. They are left outdoors in mild climates, but in cold countries the tuberous rootstalks are taken up and stored in a dry and frost-proof place. In most species the stem grows to a height of two to three feet, the flowers appearing at the upper part, while clusters of leaves are borne at the lower part.

TUBEROSE.

TÜBINGEN (tü′bĭng-ẹn), a celebrated university city of Germany, in Württemberg, twenty miles southwest of Stuttgart. It is on the Neckar River, at the border of the Black Forest (Schwarz Wald), and may be reached by railway. Duke Eberhard founded the famous university in 1477, when it had four faculties, and it soon became a distinguished seat of learning. In 1534 the university adopted the reformed faith, added a Protestant theological seminary in 1536, and provided a Roman Catholic theological faculty in 1817. A powerful influence has been exercised by the University of Tübingen on the religious and scientific thought of Europe. Among its eminent teachers are Melanchthon, Reuchlin, and Baur. At present the university has ninety professors and teachers. It has excellent botanical gardens, laboratories, a gymnasium, and collections in zoölogy, mineralogy, and comparative anatomy. The library has 395,000 volumes. The attendance is about 1,600 students, of whom about 300 are foreigners. Tübingen is beautifully situated and improved, thus making it a favorable place for study. It has telephones, electric lights, pavements, and rapid transit. Population, 1905, 16,809; in 1920, 17,986.

TUCKAHOE (tŭk′ä-hō), the common name of a peculiar vegetable growth found in the southern part of the United States, called also Indian leaf or Indian bread. Its development is not well understood. It usually forms large masses upon old roots and has been classed as a spurious fungus growth. The exterior is bark-like and the interior is of a whitish compact formation. Like the European truffle, it grows only under the surface, often several inches in diameter. The interior is bitter and unfit to eat, but it is used to some extent as a medicine.

TUCKER, Saint George, jurist, born at Port Royal, Bermuda, June 29, 1752; died in Winchester, Va., Nov. 10, 1828. He studied at William and Mary College, served in a naval expedition against Bermuda in 1775, and two years later returned to the colonies to take part with the American Revolutionists, receiving a promotion to the rank of lieutenant colonel at the siege of Yorktown. He married Frances Bland Randolph, mother of John Randolph, in 1778. Subsequent to the war he became judge of the general court in Virginia, revised the digest and laws of that State, and served for some time as professor of law at William and Mary College. President Jefferson appointed him on the court of appeals in 1803, in which office he served until 1811, when he became judge of the United States district court in eastern Virginia. His writings include "Letters on the Alien and Sedition Laws" and "Dissertation on Slavery." He edited an edition of Blackstone's "Commentaries" and published "Commentary on the Constitution."

TUCKERMAN (tŭk′ẽr-mạn), **Henry Theo-**

dore, author, born in Boston, Mass., April 20, 1813; died in New York City, Dec. 17, 1871. Ill health required him to abandon college before completing the course. He made an extensive tour in Europe, visiting Italy and other European countries, and in 1835 published "The Italian Sketchbook." On returning to America, he pursued a postgraduate course and subsequently devoted his attention wholly to literature. Many of his early writings, such as essays, criticisms, and biographical sketches, were published in magazines. His published works include "Rambles and Reveries," "Memorial of Horatio Greenough," "Book of American Artists," "Leaves from the Diary of a Dreamer," "Thoughts on the Poets," "Life of John Pendleton Kennedy," "America and Her Commentators," "Characteristics of Literature," and "Essay on Washington."

TUCSON (tū-sŏn′), a city in Arizona, county seat of Pima County, on several surfaced highways, 60 miles north of the Mexican boundary. It is on the Southern Pacific Railroad and is surrounded by a productive mining and agricultural country. Among its principal buildings are the county courthouse, the public library, the high school, the Saint Joseph's Academy, a Presbyterian school for Indians, the Desert Botanical Laboratory, the Church of Saint Xavier, and the University of Arizona. The streets are lighted by gas and electricity and have numerous other modern improvements. It has a large trade in live stock, wool, hides, and copper, gold, and silver ores. A short distance south of the city is the Papago Indian Reservation. Tucson was founded by Jesuits in 1660 and became a possession of the United States in 1853 as a part of the Gadsden purchase. It was the capital of Arizona from 1867 to 1877. Population, 1920, 20,292.

TUCUMÁN (tōō-kōō-män′), a city of Argentina, capital of the province of Tucumán, on the Tala River. It is situated in a fertile farming and stock-raising country, which is rich in timber. The principal buildings include a Jesuit college, several convents, a cathedral, and a number of government buildings. Among the manufactures are leather, sugar, furniture, lumber products, brandy, clothing, and machinery. Gas and electric lights, rapid transit, and a number of other modern improvements have been introduced. The city has a large trade in live stock, lumber, and merchandise. A congress met in Tucumán in 1816 and declared the La Plata states independent of Spain. Population, 1908, 51,046; in 1922, 80,685.

TUDOR (tū′dẽr), a dynasty of England. It was of Welsh extraction and occupied the throne of England from 1485 until 1603. Tudor is the Welsh equivalent of Theodore. Owen Tudor was the first of the family and was first known as a brewer in Anglesey, but subsequently took part in the Battle of Agincourt. His military record commended him to Catharine, widow of Henry V., who made him clerk of the household and afterward entered into a marriage contract with him. Public indignation at this marriage ran so high that the queen was forced to seek refuge in a convent, while Tudor was imprisoned. He escaped soon after and found protection under Henry VI., who afterward made him lieutenant of Denbigh. Two sons resulted from this marriage, named Edmond and Jasper. The king bestowed the earldom of Richmond on Edmond and the earldom of Pembroke on Jasper. The Earl of Richmond married Margaret Beaufort, a descendant of John of Gaunt, and their son became Henry VII. of England, who, by marrying the daughter of Edward IV., united the houses of Lancaster and York, thus ending the War of the Roses. The five Tudor sovereigns are Henry VII., Henry VIII., Edward VI., Mary, and Elizabeth. Among the noted events of the period including the reigns of these sovereigns are the Reformation and the establishment of the Anglican Church. See **England.**

TUESDAY (tūz′dā), the third day of the week, so named from Tiw, or Tyr, the son of Odin, the Scandinavian god of war. In the Roman calendar it is called *Dies Martis,* from Mars. Shrove Tuesday occurs immediately before Lent.

TUFA (tū′fà), the name applied to any coarse rock whose particles are held together by lime or silicate. The term is of Italian origin, meaning calcareous rock. *Volcanic tufa* is the name applied to rock of this class which emanates from volcanoes.

TUFTS COLLEGE, a coeducational institution of higher learning, at Medford, Mass., under the control of the Universalists. It was founded in 1852 and was so named from Charles Tufts, who made a number of gifts to the institution. The departments include those of medicine, dentistry, divinity, liberal arts, and engineering. A biological laboratory is maintained at South Harpswell, Me. The Barnum Museum of Natural History, the gift of P. T. Barnum, has a fine zoölogical collection. The value of the property is $2,250,000 and the library contains 92,000 volumes. It has a faculty of 275 and an attendance of 1,750 students.

TUILERIES (twēl-rē′), the name of a splendid palace and gardens of France, situated in Paris, on the right bank of the Seine River. The site was originally outside the city and was occupied by tile works, hence the name. The property was purchased by Francis I., who bestowed it as a present on his queen mother, Catherine de' Medici. In 1564 the latter began to build the palace after plans by Philibert Delorme. Henry IV. enlarged it in 1600 and it was subsequently modified and improved by Louis XIII., who was the first to make it a royal residence. Later additions were made by Louis XIV., Napoleon I., and Napoleon III. Louis XVI. was forced by the people to make

it his abode in the memorable Revolution of 1789 and from that time it continued to be the royal and imperial residence until 1871, when it was destroyed by the Commune. The ruins were removed in 1883 and extensive improvements were made on the grounds, converting the fifty-acre tract into a beautiful park.

TULA (tōō'lä), a city in Russia, capital of the government of Tula, on the Upa River, 118 miles south of Moscow. It has connection with other trade emporiums by several railroads and canals and is surrounded by a fertile grain and dairying country. Among the manufactures are cutlery, bell metal, edged tools, brushes, cordage, soap, leather, clothing, firearms, and machinery. The large cannon factory was founded by Peter the Great, which has continued to be the source of large supplies for the Russian army. Tula occupies a low site, but has considerable street and general improvements. It is lighted by gas and electricity. The streets are improved by waterworks, pavements, and means for rapid transit. It has a large trade in farm produce and manufactures. Population, 1922, 146,486.

TULANE UNIVERSITY, an institution of higher learning at New Orleans, La., established by the State Legislature in 1847. It was known as the University of Louisiana until 1884, when it received a bequest of $1,050,000 from Paul Tulane (1801-1887), and at that time the name was changed to Tulane University of Louisiana. About the same time Josephine Louisa Newcomb of New York made a gift of $100,000 for the education of white girls and young women, with which fund the H. Sophie Newcomb Memorial College was erected. It has a productive endowment fund of over $6,960,000. The university property has a value of $4,100,000 and as a whole is one of the largest and best equipped institutions of the South. The courses include medicine, arts, sciences, pharmacy, law, dentistry, and engineering. It has a library of 105,000 volumes and a beautiful campus. Near the grounds is the celebrated Audubon Park. The faculty includes 415 professors and instructors and the attendance is 4,515 students.

TULIP (tū'lĭp), a genus of bulbous plants of the lily family, including several hundred species. Most of the cultivated varieties are native to Asia Minor and Southern Europe. The *common garden tulip* is indigenous to the Levant and is now cultivated on a large scale in flower gardens. The *sweet-scented tulip* is highly fragrant, bearing large leaves and a single flower. Many varieties of colors have been obtained by cultivation. Large prices were paid in the 17th century for new species, the tulip being greatly in fashion at that time, and even now special bulbs have considerable value in the market. Tulips are cultivated most extensively in Holland, both for the flowers and the bulbs, which are exported in large quantities. A large and showy species, the *Turkestan tulip,* is prized for its deeply colored scarlet flowers. Among the species grown extensively are the *parrot, florist's, garden, show,* and *sweet-scented* tulips. These species may be readily forced in greenhouse culture.

SWEET-SCENTED TULIP.

TULIP TREE, a large tree closely allied to the magnolias. It is native to the forest of North America, extending from the Gulf of Mexico to Canada, and is so called from the resemblance of its flower to the tulip. In some sections it is known as *whitewood, canoe wood,* or *poplar.* It is one of the largest native trees, attaining a height of 90 to 150 feet and a diameter of eight to nine feet. The trunk is covered with ash-colored bark and the leaves are about four inches long, smooth, and peculiarly truncated, giving them an appearance as if cut off at the end.

TULSA, a city of Oklahoma, county seat of Tulsa County, on the Arkansas River, about 45 miles northwest of Muskogee. It is on the Santa Fé, the Missouri, Kansas and Texas, and other railroads, and is surrounded by a fertile section. The features include the courthouse, the high schools, and a large general trade. It has vast oil refineries, cotton industries, and machine shops. Tulsa University is located here. West Tulsa was annexed in 1909. Population, 1920, 72,075.

TUMOR (tū'mẽr), an abnormal swelling on any part of the body, not caused by inflammation. The term is limited to growths that are apparently without purpose and usually without a well-understood cause. In structure, the tumors are a reproduction of the normal tissue, but they differ from it in being less fully developed and for the additional reason that there is a tendency to undergo degenerative changes. In some cases they are malignant, that is, they are liable to spread throughout the system after being removed, appearing to spread through the agency of the blood and lymphatic current. A benign or simple tumor does not reappear when removed by artificial means.

Malignant tumors have attracted marked attention for many centuries. They are divided into the two groups known as cancers and sarcomata. Since *cancers* are composed of epithelial cells, they occur in the parts of the body where there is normally epithelium, as in the breast or stomach. *Sarcomata* appears mainly in

the tendons and about the bones, and their composition is mainly connected tissue. Theories differ vastly as to the cause of tumors. Among them are the views that they result from a general disorder of the blood, that they are due to local injury and irritation, that some derangement during the period of foetal life subsequently causes abnormal growths, and that they may be generally assigned to the action of microbes.

TUNDRA (tōōn'drȧ), the name applied to the plains bordering on the Arctic Ocean, both in Siberia and North America, so called from the Finish word *tentur,* meaning marshy plain. These regions are characterized by swamps of bog moss and lichens, but the surface is quite level or gently undulating. Some tundras have numerous small lakes, where small species of ferns and rushes grow, and in many places flowering plants are numerous. In the summer they are frequented by wild birds, which nest in the inaccessible morasses, and during the winter the region is extremely cold. During the summer the soil melts to a depth of one or two feet below the surface, but beyond that depth the earth remains frozen throughout the year. Vegetable growth causes the surface to rise slowly, hence extensive peat bogs are formed. Much silt and great layers of ice are carried from the warmer regions by means of rivers on the approach of spring, which accounts in part for the bones of extinct animals, such as the mammoth and the rhinoceros, being found securely protected from the atmosphere.

TUNGSTEN (tŭng'stĕn), a metallic element closely related to uranium. It is found chiefly in the mineral wolframite, a tungstate of iron and manganese. It occurs native with oxide of tin. The color is steel-gray and it can be melted only at white heat. It is hard, brittle, and crystalline. The chief use of this metal formerly was as a material for increasing the hardness and tenacity of steel. Since 1907 it has entered largely into electric lighting, mainly as a filament in lamps, in which it has displaced the ordinary carbon incandescent lamps to some extent. Although it is more expensive and fragile than the carbon lamp, the normal life is longer and the efficiency is greater. See **Chemistry.**

TUNGUS (tōōn'gōōs), a native race of Asia, found chiefly in the eastern part of Siberia. They inhabit the northern part of Saghalien, whence they extend westward to the Yenesei River, and scattering settlements are found as far south as the country of the Manchus. They engage chiefly in hunting and a pastoral life and may be classed among the nomadic races of Asia.

TUNIC (tū'nĭk), an under-garment worn by the ancient Greeks and Romans. It reached to or below the knees, was confined to the waist by a girdle, and was made either with or without sleeves. In Rome the tunic was a common garment of both sexes and was worn under the *palla* and the *toga.* The poorer classes made it of linen, but the wealthy used silk of an inferior grade.

TUNING FORK, an instrument made of steel and used to regulate the pitch of the voice or of a musical instrument. It has two prongs that spring from a handle of the same material, and the latter serves as a sound post to transmit the vibrations of the fork. To set the fork in vibrations, one of the prongs may be struck against any hard substance, or the prongs may be pressed together and then released quickly. By filing the ends of the prongs, or between them near the ends, a tuning fork may be made sharper, and it may be made flatter by filing at or near the bend. The tuning fork is generally tuned to C in the treble C clef, because organ builders start their tuning from that note.

TUNIS (tū'nĭs), a city of North Africa, capital of the state of Tunis, on the Gulf of Tunis, an inlet from the Mediterranean. It occupies a fine site near the mouth of the Mejerdah River, about three miles from the ruins of ancient Carthage. The older streets are narrow and unpaved, but the newer parts of the city have a European appearance, being clean, paved, and lighted by gas and electricity. Two walls surround the city and it is defended by several forts and a castle. The most important structures include the palace of the bey, several public offices, the cathedral, the Moorish college, and a number of Greek, Roman, and other Christian houses of worship. Many of the older buildings are low and have no windows toward the streets, but the newer part of the city contains substantial blocks of business houses and residences in the French style. It has several fine parks and fountains. Water for city use is supplied by an aqueduct built in ancient times from Jebel Zaghwan, which is spoken of in the history written by Strabo. Telephones, telegraph connections, and rapid transit have been constructed within recent years. The harbor is safe and commodious. It has extensive railroad connections with the interior, making the city an important export and import market. Among the manufactures are olive oil, silk and woolen textiles, soap, leather, turbans, tapestry, shawls, clothing, and native machinery. The exports embrace manufactures, gold dust, fish, ivory, cattle, coral, grain, and fruits. About one-third of the inhabitants are Europeans. Population, 1922, 177,582.

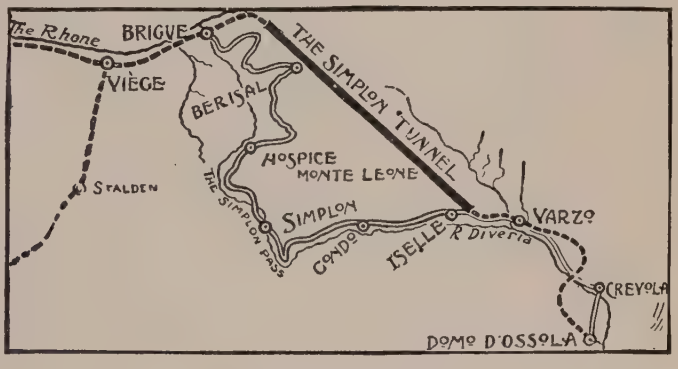
TUNIS, a country of North Africa, one of the Barbary States, forming a dependency of France. It is bounded on the north and east by the Mediterranean, on the southeast by Tripoli, and on the west and southwest by Algeria. It has an area of 64,240 square miles. The coast line is irregular. It is indented by a number of extensive inlets, the most important being the Gulf of Gabes. Cape Blanco, on the northern shore, is the most northerly point of Africa, and east of it is Cape Bon. The northern coast is precipitous and rocky, but the eastern shore region is

generally low and sandy, and the coastal plain is quite fertile. Ranges of the Atlas Mountains traverse the central part, rising not more than 6,500 feet above the sea. In the interior are a number of extensive lakes, among them Lake Faroun. The Mejerdah, rising in the Atlas Mountains and flowing into the Mediterranean near Tunis, is the principal river. The northern part of Tunis is generally fertile, and the southern part merges into the Sahara Desert. In the region toward the south are numerous mineral springs and flowing wells serviceable in irrigating the more arid portions. Salt, galena, lead, saltpeter, quicksilver, phosphate, and mineral oil are among the chief minerals. The sponge and tunny fisheries are important. Tunis has extensive and valuable forests, especially in the mountains, and large tracts are cultivated as olive plantations.

Agriculture is the chief occupation. The principal farm products are wheat, barley, oats, cotton, grasses, and tobacco. Buffaloes, cattle, camels, horses, and sheep are reared in abundance. The fruit cultivated includes dates, olives, grapes, oranges, lemons, bananas, and other varieties. The wild animals are largely extinct, but the chase still offers opportunities to secure the wild boar, quail, partridge, wolf, and many aquatic birds. Fully 375,000 acres are covered by the valuable cork trees, which supply large quantities of marketable cork. Among the manufactures are woolen and silk textiles, cochineal, olive oil, soap, sponges, leather, metalware, wine, and machinery. The exports include phosphate, wheat, cattle, barley, olive oil, alfalfa, sponges, fish, cork, and tanning bark. Caravans carry on a large trade with the Sahara and other regions toward the south. In 1917 the country had 1,275 miles of railway in operation, most of which belongs to the state. A large part of the trade is with France, Great Britain, Germany, and Italy. The government is administered under the native bey, who is assisted by nine ministers as heads of departments. Tunis is the capital and largest city. Other cities of importance include Sousa, Bizerta, Kairwan, and Sfax.

The inhabitants are principally Berbers, Moors, Kabyles, and Arabs, who are chiefly Mohammedans. A number of Christian missionaries and public schools are maintained, and several secondary and higher institutions of learning have been established under French supervision. The Jews have attained a considerable foothold in commercial enterprises and maintain a number of synagogues and schools. A high per cent. of illiteracy prevails. The region occupied by Tunis corresponds nearly to that of ancient Carthage, and on it were fought many of the famous battles of Hannibal, Scipio, Hamilcar, and the Jugurthine leaders. It was overrun by the Vandals in 429. Subsequently it passed to the Greeks and later to the Mohammedans. In the 13th century it became independent of European influence, but Charles V. soon made it tributary to Spain. The Spaniards were driven from Tunis under Sultan Selim in 1574, when it was made a Turkish province. It was essentially a pirate state until 1816, when piracy and the slave trade were suppressed. In 1882 it was annexed as a French province and since then it has advanced materially in prosperity. Population, 1922, 1,982,050.

TUNNEL (tŭn'nĕl), a passage cut through an eminence, such as a hill, rock, or mountain, to afford passage for railways, highways, canals, or aqueducts. Tunnels are constructed for similar purposes under towns and rivers, both classes dating from remote antiquity. In the early history of tunnels the work was done exclusively by hand, the rocks being broken either by sledges or by the agency of fire, but in modern times powerful explosives and elaborate machinery are utilized. The method of proceeding in tunneling depends chiefly upon the kind of materials to be excavated. To ascertain the character of such materials, borings are made and trial shafts are sunk from the surface. The trial shafts are afterward utilized in most of the works for ventilation purposes, air pumps being provided to facilitate circulation. Tunnels pierced through solid rock have a sufficiently strong roof, but others have an arched roof lined with brickwork or stone masonry. Herodotus mentioned a tunned on the island of Samos, having a length of 4,250 feet, which was utilized to provide passage through a mountain. Alexandria had tunnels to supply water from the Nile, while the Romans, Peruvians, and Mexicans carried supplies of water for long distances by aqueducts and through underground passages.



THE SIMPLON TUNNEL.

Among the most noted European tunnels of modern times may be mentioned those of Simplon, Saint Gothard, Arlberg, and Mont Cenis.

The Mont Cenis tunnel is seven miles long and the Saint Gothard tunnel is over nine miles, both piercing the European Alps. The American tunnels include one at Port Huron, Mich., passing under the Saint Clair River; the Pennsylvania Railroad tunnel under the Hudson River, connecting New Jersey with New York City; one in Chicago under Lake Michigan, serving to secure a supply of city water from a distance of several miles; and one under Saint Louis, affording connection between the union depot and the Eads's Bridge across the Mississippi. The Great Divide tunnel at Hagerman Pass, Colo., was opened for traffic in 1893. It pierces the Rocky Mountains through solid gray granite. The length is 9,393 feet; height above sea level, 10,800 feet; and cost, $1,125,000. It is so called because the water falling on the east side of the mountain flows toward the Atlantic and that of the west side, toward the Pacific. The cut through the Cascade Mountains, on the line of the Northern Pacific Railroad, west of Kalispel, Mont., is the greatest railroad tunnel in America. It is about three miles long and cost $4,250,000. The Moffat Tunnel, in Colorado, on the line of the Denver and Salt Lake Railroad, was completed in 1926. It is about 50 miles west of Denver, passes under James Peak, and is about six miles long.

Another class of tunnels includes those known as *subways,* which are constructed in the larger cities to furnish means of rapid transit. The largest of these in North America are the subways of New York City, which extend from the Battery to the Bronx, furnishing communication by a system of double tracks, and extensions are operated to Brooklyn, Jersey City, and other centers. Boston and Philadelphia likewise have subways. The most noted subways of Europe are in London, Berlin, and Paris. See **New York,** Subhead BRIDGES; **Simplon Tunnel.**

TUNNY (tŭn′nў), a class of fish belonging to the mackerel family, including a number of important species. The *American tunny* ranges from New Jersey to Nova Scotia. It is four to twelve feet long, is dark brown above and lighter below, and is valuable for its flesh and the oil it yields. An allied species is common to the vicinity of the West Indies, which is also a valuable food fish. The most important species of tunny, known as the *long-finned albacore,* is found in the Mediterranean and off the coast of Western Europe. It ranges in length from eight to twenty feet, large specimens weighing from 800 to 1,200 pounds. The upper part has a dark blue color and the lower side has a silky color with dusky spots. The flesh, which is of a pink hue, is highly esteemed, both fresh and preserved. The tunny fisheries of the Mediterranean have been important since the early history of man, and the most extensive catches are on the coasts of Sicily, Sardinia, Italy, Spain, and Turkey.

TUPPER (tŭp′pĕr), **Sir Charles,** Canadian statesman, born in Amherst, Nova Scotia, July 2, 1821. After attending the public schools of Nova Scotia, he studied medicine at Edinburgh, Scotland, and was granted a degree in 1843. He was a member of the executive council and provincial secretary of Nova Scotia from 1857 to 1860, and in 1864 became Prime Minister, but retired from office when his Province was united with the Canadian federation, in 1867. In 1870 he was made a member of the Privy Council of the Dominion of Canada and in 1884 became High Commissioner for Canada in London. His services in negotiating the fisheries treaty with the United States in 1888 caused him to be made a baronet. He retired from the High Commissionership in 1896 and, returning to America, became Premier of the Dominion, but was soon succeeded by Wilfred Laurier. In 1900 he was defeated in the election by Cape Breton, where he had been supported for forty years, and subsequently retired from public life. Acadia College and Cambridge University granted him degrees. He died Oct. 30, 1915.

SIR CHARLES TUPPER.

TUPPER, Martin Farquhar, inventor and author, born in London, England, July 17, 1810; died Nov. 29, 1889. He studied at Charterhouse, London, graduated from Oxford University in 1831, and in 1835 was admitted to the bar. After conducting a few cases at law, he gave up that profession and engaged in literary work. In 1845 he was admitted to the Royal Society. He made two visits to America, in 1851 and 1876. The most popular of his writings is "Proverbial Philosophy," which appeared in three series in the period between 1838 and 1867, and was the means of netting him a profit of about $90,000. His inventions include glass screw tops to bottles, safety horseshoes, and several others, but they were not of material success. His writings include "Three Hundred Sonnets," "Hymns for all Nations," "My Life as an Author," "Ballads for the Times," and "Our Canadian Dominion."

TURANIAN (tū-rā′nĭ-ạn), a term applied by some writers to an extensive branch of the Eurasian languages. It was first used by the Persians, who called their own country Iran and the countries lying toward the north Turan; hence, the people of the latter became known as Turanians. Originally the term included all speech of Asiatic origin that is neither Aryan nor Semitic, but in later use it is practically synonymous with Ural-Altaic. In this wider sense it embraces the speech of the Bulgarians, Hungarians, Finns, and Lapps of Europe and the

Turks or Tartars, Samoyeds, Manchus, and Mongols of Asia or Asiatic origin. These widely separated peoples speak dialects less closely connected than the Aryan and Semitic groups. This circumstance has led many writers to classify some as distinct languages, as, for instance, the Manchurian and Mongol tongues. It is noteworthy that a wide difference exists in the state of civilization, customs, and industries pursued by the several branches. The Samoyeds of Northern Asia are the lowest in the scale and the peoples in Europe belonging to this class are the most advanced, as the Hungarians and Finns. Both of the latter have a language of considerable culture, with a literature embracing songs, theology, history, poetry, law, geography, and other writings. The term Turanian, in its more limited application, is confined to those peoples who inhabit the Ural and Altai Mountain ranges and the neighboring country.

TURBAN (tûr'bạn), the name of a covering for the head, worn extensively in Asia and North Africa. In most countries it is in the form of a roll of cloth twisted around a cap. The turban worn by a sultan is ornamented with gems and it is looked after by an officer called the *dulbend aga.* Green turbans are usually worn by emirs and the grand vizier has decorations of heron feathers in his turban. More recently the Turks generally abandoned it for the fez or red skullcap.

TURBINE (tûr'bĭn), a water wheel in which advantage is taken of the reaction of the escaping jet. Turbines are constructed in a great variety of forms and their axis of rotation may be either vertical or horizontal. In most cases the turbine wheel is on a vertical shaft and moves within a close-fitting box. Such a turbine is called an *inside wheel,* but if it is on the outside of the curved guide it is termed an *outside wheel.* A vertical or oblique pipe or chute, called the *penstock,* admits the water to the wheel, which is provided with bucket floats that point in the same direction. The water enters through openings between fixed curved guides, so inclined to the buckets that on leaving the guides it strikes the buckets in the most advantageous direction. The wheel is driven partly by the momentum of the moving water and partly by the weight of the water in the buckets. In addition to this, on running out of the buckets, the reaction of the escaping stream aids in turning the wheel. Turbines of the highest capacity are operated at Niagara Falls, both in Canada and the United States, and the construction is such that the weight of the wheel is supported by the upward pressure of the water against a disk in the top of the case inclosing the wheel.

TURBOT (tûr'bŭt), a species of the flatfishes, the most valuable of the genus. It is broad and scaleless and has conical tubercles on the upper side. The dorsal fin extends from the upper lip to the tail. Its eyes are on the left side, which has a brownish color, and the right or lower side is white. The *spotted turbot* found off the Atlantic coast of North America, sometimes called the plaice and the water flounder, weighs 15 to 25 pounds. It is about twice as long as it is wide. The *common turbot* found in the North Sea and other waters of Western Europe attains a weight of 60 to 90 pounds, but specimens weighing 180 pounds have been caught. Like other flatfishes, it swims near the bottom, the best turbot fisheries being near deep shores. The flesh is white and delicate and has been in high esteem from antiquity.

TURENNE (tü-rĕn'), **Henri de la Tour d'Auvergne, Count of,** eminent military commander, born in Sedan, France, Sept. 11, 1611; died July 27, 1675. He was the second son of Henry Bouillon, Prince of Sedan, and of Elizabeth, daughter of William the Silent, Stadtholder of Holland. In 1615 he was sent to Holland for military training under his uncle, Maurice of Nassau, who was then the most eminent soldier of Europe. He entered the army of France in 1630, serving in Germany and North Italy, and in 1642 was made a marshal and given command of the Rhine in the Thirty Years' War. The Bavarians under General Mercy defeated him at Marienthal, but in 1645 he won the famous Battle of Nordlingen, in which Mercy was slain and the close of the war was hastened. The civil wars of the Fronde soon followed, Turenne and Condé being on opposite sides, but the latter was defeated in a series of battles and was obliged to leave France after his defeat of the Dunes in 1658. Turenne was soon after created marshal general of the armies of France by Louis XIV.

When France and Spain again took up arms, in 1667, he invaded Holland with an army of French, but was compelled to retire because the Dutch cut their dikes and flooded the country. In 1672 he invaded Westphalia for the purpose of opposing Montecuccoli, the eminent Austrian general who had succeeded the Elector of Brandenburg in command of the imperial army, but his campaign in Germany proved less fortunate for him. He first devastated a large part of the Palatinate and met his opponent in battle at Salzbach on July 27, 1675, but was struck by a bullet while in the act of leading his troops to the attack. Turenne ranks next to Napoleon as a military leader of France. He was buried with distinguished honors in Paris, where several fine monuments have been erected to commemorate his life and military achievements. Turenne was educated as a Protestant, but Bossuet influenced him to become a Catholic in 1668.

TURGENIEFF (tōōr-gĕ'nyĕf), **Ivan Sergeyevitch,** celebrated novelist, born in Orel, Russia, Nov. 9, 1818; died in Bougival, France, Sept. 3, 1883. His family removed to Moscow in 1828, where he took a university course, and subsequently studied in Saint Petersburg and Berlin, Germany. He returned to Russia from Berlin in 1841, devoting his time largely to lit-

erary contributions to several periodicals, and for some time held a government position at Saint Petersburg. He was liberal and progressive in advocating civil reforms and was imprisoned and afterward banished, but in 1854 regained his freedom in Russia. In 1863 he removed to Baden, Germany, and later to Paris, and remained in France most of the time until his death. He wrote in Russian, German, and French, but there have been a number of translations into the English and other languages. His productions are very numerous and include, besides novels of a high character, a number of writings devoted to the life of Russian peasantry, history, and civil reforms. Among those best known are "Tales of a Sportsman," "Nest of Nobles," "Fathers and Sons," "Dimitri Rudin," "Spring Floods," "Journal of a Useless Man," and "Virgin Soil." The last mentioned is one of the most valuable works treating of Russian peasantry and the Nihilist movement.

TURGOT (tür-gō'), **Anne Robert Jacques,** statesman and economist, born in Paris, France, May 10, 1727; died there March 18, 1781. He descended from an ancient family of Normandy, which included a number of eminent clergymen, and was educated for the church, studying at the Seminary of Saint Sulpice and at the Sorbonne. In 1749 he was prior of the Sorbonne, an office conferred on some distinguished student, and soon after became an advocate. He was given official charge of the Limousin province in 1761, where he introduced the cultivation of the potato, improved bridges and highways, and greatly extended commercial and industrial enterprises. Louis XVI. appointed him minister of marine in 1774, but in the same year promoted him to the ministry of finance. His administration was of vast financial value to France, since he placed the country on a substantial basis, promoted public works, encouraged improvement in agriculture, reduced taxation, and provided for the importation of grain free of duty.

The reforms of Turgot were supported by the larger mass of people, but met with opposition among the statesmen and nobles, and the king finally yielded to his enemies and dismissed him from office in 1776. It is quite probable that the French Revolution would have been averted had the reforms of Turgot been carried forward. After retiring from office, he devoted himself to study of ancient poets and physical science, and in 1777 became vice director of the Academy of Inscriptions. Franklin and Adam Smith were among his personal friends. It was Turgot who said of Franklin, "He snatched the thunderbolt from heaven, and the scepter from tyrants." His writings include "Reflections upon the Formation and Distribution of Riches," "Benefits Conferred by the Christian Religion upon Mankind," "Memoirs on the American War," "Usury," and "Historical Progress of the Human Mind." He contributed a number of articles to the "Encyclopedie."

TURIN (tū'rĭn), a city of northern Italy, in Piedmont, on the Po River, 76 miles southwest of Milan. The surrounding region is noted for its fertility and toward the west are the foothills of the Alps, which include Mont La Superga, height 2,407 feet. Turin is a city of great beauty, having broad and regular streets and large squares and public gardens. The Cathedral of Saint John the Baptist dates from the 15th century and is a fine specimen of cruciform renaissance architecture. It has many other churches of fine structure, numerous hospitals, schools, convents, and government buildings. The Madama Palace, erected by William of Montferrat in the 13th century, is an interesting building, and the extensive royal palace dating from the 17th century is likewise remarkable for its beauty. The University of Turin, founded by Lodovico di Acaja in 1400, is one of the largest educational institutions of Southern Europe. It has departments of medicine, literature, surgery, jurisprudence, philosophy, physics, mathematics, and sciences. In connection with it is a fine botanical garden, an observatory, a museum, and an extensive library. It is attended by 2,375 students.

The city has numerous pleasant promenades, several fine monuments and statues, and modern municipal facilities. Most of the streets are well lighted with gas and electricity. It has stone and asphalt pavements, waterworks, sewerage, and an extensive system of rapid transit. Among the manufactures are jewelry, silk and woolen goods, pianos, paper, pottery, porcelain, earthenware, machinery, ironware, vehicles, clothing, scientific instruments, and spirituous liquors. This is the center of a large trade in grain, fruit, wine, and merchandise. The central offices of the North Italy Railway are at Turin, which has a fine central depot and extensive machine shops.

Turin was so named from the Taurini, a Ligurian tribe which lived there at an early period. Its first mention in history is in connection with Hannibal, by whom it was captured at the time he crossed the Alps into Italy. The Romans made it a colony in 166 B. C., but at the decline of the empire it became a Lombard city, and long served as the capital of a Lombard duchy. It became the seat of the Duke of Susa in the time of Charlemagne, and the descendants from that line ruled it until 1032, when it became a possession of the house of Savoy. Subsequently it passed to the French, who held it until 1815, when it was restored to the house of Savoy. It was the capital of Italy from 1859 to 1865, yielding that distinction to Rome in the latter year. Turin has grown with remarkable rapidity within the last fifty years, which is due largely to its extensive railroad and manufacturing enterprises. Population, 1922, 458,985.

TURKESTAN (tōōr-kĕs-tăn'), meaning the country of the Turks, an extensive scope of territory of Western Asia. It is bounded on the north by Siberia, east by China, south by Tibet,

India, Afghanistan, and Persia, and west by the Caspian Sea. The region is divided into two portions by the tableland of Pamir, an elevated ridge about 15,000 feet high, thus forming Eastern Turkestan and Western Turkestan. It is inhabited by a mixture of Asiatic peoples, though the population includes chiefly Aryans and Turanians. The slopes of the Pamir are occupied by a purely Aryan population. On the slopes of the Thian Shan Mountains are extensive settlements of Kirghiz, while the northwestern part is occupied by Kalmucks, the central part by Turks and Persians, and the northeastern part by Mongols. The language is largely a Turkish dialect, but is mixed to a considerable extent with Chinese and Persian words.

Much of the history of Asia is connected with Turkestan. A large part of the western region belonged to Persia in the early historic period and many of the principal cities were founded while it was under Persian control. Alexander the Great annexed it along with Persia to Macedonia, but it was conquered by the Arabs in the 8th century. With the decline of the Arab caliphs, it became divided into small possessions and was finally overrun by Genghis Khan and his Mongol forces, but on his death came under the government of his son, Jagatai. Timour succeeded the latter and in his reign of 35 years Turkestan developed marked influence as the center of an immense empire, which extended from Burma to the Danube and from Siberia to the Persian Gulf. The period of Timour's reign may be called the golden age of Turkestan, since he brought skilled artisans and learned men to its cities, constructed internal improvements, and enriched the country by vast spoils of war. His death was followed by a division of the empire into various independent states, which, in the latter part of the 15th century, began to war against each other. Its subsequent history is that of petty wars and internal dissensions until the eastern portion became a part of China and the western portion was annexed to Russia.

Eastern Turkestan, or *Chinese Turkestan,* is bounded on the north by the Thian Shan Mountains, east by China, south by Tibet and India, and west by the Pamir tableland. The eastern part merges into the Desert of Gobi and in the central part is the Tarim Desert. Practically all of the region lies within the basin of the Tarim River, which rises in the Kakakorum Mountains and flows into the inland Lake Lob-nor. Its principal tributary from the south is the Khotan River. Much of the surface is of a desolate and unattractive character, including numerous salt marshes and desert wastes, but along the streams are considerable belts of fertile land. The mountain districts are rich in minerals, including gold, silver, copper, lead, agate, iron, sulphur, jasper, and asbestos. Extensive deposits of salt prevail in the vicinity of Lob-nor.

Rice, cotton, wheat, barley, corn, flax, tobacco, and fruits comprise the chief soil products. Large tracts have been redeemed for cultivation by irrigating the lands from streams and mountain snows. Pastoral life is followed by many of the people, the live stock including horses, buffaloes, camels, sheep, and cattle. It has manufactures of carpets, linens, cotton and silk goods, jewelry, silver and gold wares, clothing, and utensils. Most of the unproductive regions are frequented by nomadic tribes, who find pasturage for their herds in the valleys. The country exports cereals, fruits, live stock, minerals, and merchandise. Mohammedanism is the chief religion. Numerous schools and colleges are maintained in the larger towns. Russia claimed a protectorate over a large part of the region in 1871, but ceded its claims to China in 1879. Turkish is the common language of the people. Kashgar and Yarkand are the chief towns. Population, 615,500.

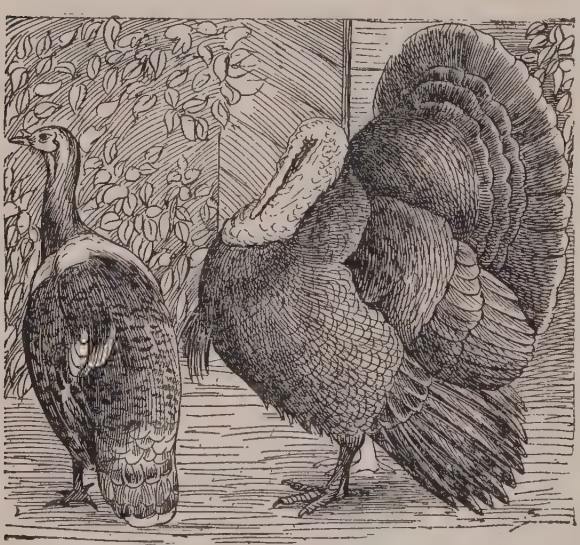
Western Turkestan, or *Russian Turkestan,* is bounded on the north by Siberia, east by the Pamir tableland, south by Afghanistan and Persia, and west by the Caspian Sea. It comprises the Turkoman Steppes, the Trans-Caspian districts, the khanates of Khiva and Bokhara, and the oasis of Merv. The Oxus and Daria (Jaxartes) are the chief rivers, both rising in the southeastern part and flowing toward the northwest into the Aral Sea. A great variety of aspects is presented by the surface and climatic conditions, ranging from desert wastes to regions of remarkable fertility and productiveness. It has deposits of coal, petroleum, marble, gypsum, iron, lead, and kaolin, and considerable wealth in silver, gold, and graphite. The manufacturing enterprises yield considerable wealth in the form of linens, machinery, hardware, woolen and silk textiles, furniture, soap, spirituous liquors, leather, carpets, and firearms. Agriculture, fruit growing, mining, stock raising, and commerce are equally important industries. It has a large caravan and railroad trade.

The Trans-Caspian Railroad penetrates from Krasnovodsk, on the Caspian, through the heart of Western Turkestan, thus providing excellent transportation facilities. It has many thriving cities, among them Merv, Bokhara, Samarkand, and Tashkend. Western Turkestan is a possession of Russia. A Russian invasion occurred in 1850, when they took Khulm and Balkh, and in 1859 annexed Kunduz. Subsequently they annexed Tashkend, Bokhara, and Merv, and since 1881 the entire region has been under Muscovite control. Russian occupation has been of immense value in that it has fostered railroad building, developed the material resources, and given to the country a more stable and beneficent government. Schools and colleges have been established in all the towns of importance. Turkish is the chief language and Mohammedan is the principal religion, but many of the inhabitants belong to the Greek, Roman, and Protestant churches. The region of Turkestan now under Russian control has an area of 1,750,000 square

miles and a population of 8,525,000. Tashkend and Boknara are the principal seats of governmental influence.

TURKEY (tûr'kỹ), a large bird native to North America. It was first brought to Europe when Hernando Cortez returned to Spain from his expedition of discovery in the 16th century. Only two species are known, the common turkey and the Honduras turkey. The *common turkey* was distributed formerly in a wild state from the Atlantic to the Rocky Mountains, extending southward to the Isthmus of Panama, but at present is found only in some sections of the southern and western parts of the continent. The bare head and neck are peculiarly marked by a number of fleshy tubercles, and the male has a tuft of hair hanging from the breast. The weight of a full-grown wild gobbler is 15 to 22 pounds, the hen being somewhat smaller, but the domestic turkey is not so large and its flesh is less finely flavored.

Turkeys in the wild state frequent only the timber districts, where they live in flocks, feeding on seeds, insects, berries, frogs, lizards, and tender plants. They nest under a bush or in tall grass, line the nest with leaves or feathers, and usually have about twelve cream-colored eggs. The plumage is a golden bronze, banded with black, and diversified by violet and greenish markings. In the domestic state the turkey is highly useful for its flesh and eggs and is reared extensively along with other poultry. It is now



TURKEY HEN. TURKEY COCK.

an important domestic fowl in Europe and other countries as well as in North America. The hen lays from ten to fifteen eggs twice a year, but the eggs are mostly incubated by female chickens, though also by the turkey hen. Young turkeys are quite tender, being easily overcome by the hot sun or cold rains, although the adult is quite hardy. The *Honduras turkey*, an allied species, is native to tropical America and the West Indies. It is somewhat smaller than the common turkey, but has more beautiful plumage. The neck is less wattled and it has eyelike spots on the tail feathers.

TURKEY, or **Ottoman Empire**, formerly an extensive country of Europe and Asia, lying north and east of the Mediterranean Sea. In addition it had extensive possessions in Africa and received tribute from a number of dependencies in Europe. The latter were practically independent in their government and their dependence upon Turkey was merely nominal, including only the payment of a tribute annually to the Sultan. Some of the boundaries are not definitely fixed and as a whole they are very irregular, owing to natural barriers, such as extensive ranges of mountains and numerous inlets from the Mediterranean and the Black Sea. The following table contains an exhibit of the territorial possessions, together with the area and population, prior to the war of 1913:

National Domain.	Square Miles.	Population.
Europe	65,325	6,330,200
Africa	405,800	1,000,000
Asia	682,200	16,898,700
Dependencies.		
Samos	180	54,440
Crete	3,330	310,400
Cyprus	3,710	237,000
Egypt	400,000	9,821,100
Total	1,560,545	34,651,840

European Turkey. Turkey in Europe extends from the Adriatic to the Black Sea and embraces fully one-third of the Balkan Peninsula. It is bounded on the north by Montenegro, Austria-Hungary, Servia, and Bulgaria; east by the Black Sea and the Bosporus; south by the Sea of Marmora, the Strait of Dardanelles, the Aegean Sea, Greece, and the Ionian Sea; and west by the Adriatic Sea and Montenegro. The Dardanelles, the Sea of Marmora, and the Bosporus separate it from Asiatic Turkey. The Pindus Mountains extend through the western part, the chain running almost parallel to the Asiatic, while in the east central part are the Rhodope Mountains, and along the northern boundary are ranges of the Balkans. Transverse ranges extend from the principal groups and valleys of considerable fertility characterize many parts of the country. Most of the surface water flows into the Aegean Sea, which receives the Maritza, Vardar, and Struma rivers. The Drin, Ergent, and Vojutza rivers flow into the Adriatic. Among the many gulfs that indent the southern shore are the Salonica, Contessa, Lagos, and Saros, while the western shore is indented by the gulfs of Drin and Valona. These gulfs furnish good harbors and navigation facilities, and the Maritza is navigable in its lower course. The coastal plain of the Aegean Sea is a level region, and extensive valleys and

interior plains characterize many parts of the country. Lake Scutari, which extends into Montenegro, is a fine sheet of water. Other lakes include Ochrida, in Albania, and Takinos, in Salonica.

Asiatic Turkey. Turkey in Asia includes all of Asia Minor and Palestine, extending east to Persia. It is bounded on the north by the Black Sea and Transcaucasia, east by Persia and Arabia, south by Arabia and the Mediterranean, and west by the Mediterranean and the Aegean seas. A narrow strip of land belonging to Turkey extends between Arabia and the Persian Gulf, and another strip is surrounded by Arabia, the Gulf of Aden, the Red Sea, Egypt, and the Mediterranean. The latter is about 160 miles wide and 1,600 miles long. It includes the provinces of Yemen and Hadjaz. The country as a whole has an extended coast line, which is broken by many gulfs and bays, and off its shores are numerous islands, most of which lie in the Aegean Sea.

The surface of Asiatic Turkey is greatly diversified. A large part of Asia Minor is a mountainous plateau, including the Taurus and the Anti-Taurus mountains, the Lebanon and Anti-Lebanon mountains, and numerous articulated spurs and ranges. Barren deserts, elevated highlands, fertile plains, and productive valleys make up the region lying toward the East. In the eastern part is the famous valley of the Euphrates, which receives the Tigris, and the drainage is carried through the Shat-el-Arab into the Persian Gulf. The Kizil Irmak and the Sakaria drain a large portion of the northern section into the Black Sea. Palestine is drained chiefly by the Jordan and the El Araba into the Dead Sea, which has no visible outlet. Many lakes with salty water are distributed throughout the central and eastern parts, of which Lake Van, near the border of Persia, is the most important.

African Turkey. The distinctly Turkish possessions in Africa are confined to Tripoli, which includes Fezzan and Barca. It is governed from the city of Tripoli, on the Mediterranean, while Bengazi, on the Gulf of Sidra, is the capital of the vilayet of Barca. Egypt is nominally a possession of Turkey, but the government is exercised largely under British influence. This is true likewise of Cyprus, a large island in the Mediterranean.

Climate. Few countries have climatic conditions that vary as greatly as those of the Ottoman Empire, although no part of the country is extremely cold. The regions bordering on the Aegean Sea have a subtropical climate, with pleasant summers and mild winters, suitable for the cultivation of cotton and fruits. Much of the interior is cut off from the tempering influences of the sea by lofty mountains, and in these sections the extremes are very marked, ranging from excessive heat in the summer to a temperature below zero in the winter. The mean temperature at Constantinople is 43° in January and 73° in July; but in the eastern part, especially in the deserts, the summer heat rises to 108°, and even to 120°. Rainfall is heaviest on the Adriatic coast and gradually decreases toward the east, where it is very scant. The drier sections are in the east central part, in the region of the saline lakes, and in the southern extension along the Red Sea and the Persian Gulf. Another dry belt extends throughout the southern part of the African possessions, especially in Fezzan and the Libyan Desert.

Mining. Few countries have mineral resources more extensive or diversified than Turkey, but the mining industry has not been developed materially. The vilayet of Salonica, on the northern shore of the Aegean Sea, is especially rich in manganese. Asia Minor has valuable deposits of lead, silver, coal, copper, antimony, and chrome. Meerschaum is obtained in large quantities at Eski-Shehr, in Asia Minor. The valley of the Tigris has an extensive field of natural gas and petroleum. Vast quantities of salt are found in the east central part, but they are worked to a very limited extent. Kaolin is obtained in the island of Rhodes. The government gives encouragement to the exportation of minerals by paying a small royalty to native operators, but the mines worked are chiefly in the hands of foreigners.

Agriculture. Farming and cattle raising are the chief industries, but both are in a primitive condition. In all sections of the empire the people are oppressed by taxation, land monopoly, poorly improved roads, and a low standard of civilization. Practically all of the land is owned by the church or the crown, making it necessary for the peasants to pay rent, many of whom are overwhelmed with poverty. However, the country has a comparatively large area of fertile lands suitable for the cultivation of rice, cotton, maize, barley, millet, rye, wheat, and fruits. Other crops include tobacco, buckwheat, madder, flax, opium, and hemp. Much attention is given to the culture of silk, both in the possessions of Europe and Asia, but more particularly in Asia Minor. The cultivation of beet roots has been introduced through the establishment of stations by Germans, who likewise promote the cultivation of hops, asparagus, and other plants. Attar of roses is obtained in large quantities in Asia Minor and Palestine, coffee is produced in Yemen, and the vine is important in many parts of the empire. Mesopotamia, once highly fertile, is now largely a barren waste on account of the irrigation works having been neglected. However, the government has restored some of the dams and is promoting interest in the cultivation of rice, dates, and other crops.

Stock raising is comparatively insignificant when considered in the light of development in America and Western Europe. Swine are grown to a very limited extent, owing to the fact that both the Jews and the Mohammedans are adverse to the use of pork. Sheep and goats are

reared in large numbers and both are important as meat-producing animals, while the milk of goats is used extensively for household purposes. Large interests are vested in stock raising in the western and central parts, where a good grade of cattle is grown. Other domestic animals include horses, poultry, and camels, the last mentioned being used chiefly in the possessions of Africa and Asia.

MANUFACTURES. It is estimated that Turkey has woodland aggregating 21,000,000 acres, about one-seventh of which is in European Turkey. These woodlands supply considerable material for export and construction purposes. Most of the manufacturing is of a primitive character, such as hand-loom weaving and the transforming of brass and copper into household utensils by artisans. Steam machinery is employed to a considerable extent in the manufacture of cotton and silk textiles, especially at Salonica and Constantinople. Among the general manufactures are carpets, attar of roses, silk goods, cotton and woolen textiles, tobacco products, furniture, glassware, cured fish, and leather products. Formerly fez caps were made in sufficient quantity to supply the home demand, but in this product, as well as in carpets and Turkish leather and yarns, there is considerable competition with the products imported. Mother-of-pearl and sponges of excellent quality are obtained in large quantities and enter to a considerable extent into the manufacturing enterprises.

COMMERCE AND TRANSPORTATION. Internal trade is burdened by taxes that are imposed in transporting from one province to another. The government charges both export and import duties as a means of raising revenue. According to the official reports, the imports greatly exceed the exports, but it is likely that the value of both is considerably underestimated for the purpose of benefiting the shippers. A large share of the internal trade is in the hands of Armenians, Greeks, and Jews. Among the exports are raisins, opium, coffee, carpets and rugs, woolen and silk textiles, tobacco, grain, hides, nuts, drugs, and fruits. The imports include textiles, sugar, petroleum, cereals, hats and fez caps, and machinery. The larger share of the foreign trade is with Great Britain, Austria-Hungary, Italy, Germany, and Russia, in the order named. The native Turks are unfriendly to the arts of conducting business and developing enterprises of the kind met with in Western Europe, and for this reason ancient methods are employed in practically every avenue of public and private business. Few highways have been improved, and the railroads do not exceed 3,950 miles. German and Russian capitalists have franchises for the construction and operation of most of the railroads and telegraph lines. The country has 18,900 miles of telephone and 30,375 miles of telegraph wires. Much of the interior trade across the deserts and highlands is carried by caravans, though there is considerable traffic by navigation on the Euphrates and Tigris and on the adjacent seas. The mercantile marine embraces only 110 steamers and 925 sailing vessels. Most of the foreign trade is carried by vessels belonging to the countries of Western Europe.

GOVERNMENT. Turkey is governed on the basis of a theocratic monarchy, with absolute executive and religious authority vested in the Sultan, who claims succession from the caliphs. A constitution was granted in 1908, but it retains so many features of the former absolute government that it cannot be compared with the fundamental laws upon which limited monarchies are based. Though legislative and executive authority is vested largely in the sovereign, it is exercised mainly by two high dignitaries, one the Grand Vizier, representing the temporal government, and the other, the Sheikh ul-Islam, being the head of the church. Both receive their appointment from the Sultan with the nominal concurrence of the *Ulema*, a body comprising the clergy and high functionaries of the law. The empire is divided into governments or vilayets, which are subdivided into provinces or sanjaks, and these are again divided into districts or kazas. The Koran remains the chief inspiration. In the administration of affairs the Sultan is assisted by the Grand Vizier, who is appointed by the Sultan, and this officer is aided by a cabinet of ten ministers. Accounts are kept in the lira and the pound, the former having a value of 36 cents and the latter, of $4.40.

Military service is compulsory on all Mohammedans who have reached the age of twenty years, and all others are exempt under the payment of a small annual exemption tax. The army includes 700,625 men and officers, and the war footing is estimated at 950,000. Turkey has no powerful navy, most of the vessels being of remote construction and intended for local defense. Mauser rifles are used in the army, and the organization and discipline are largely on the plan adopted by German officials. Land and property taxes; excises on spirits, salt, and tobacco; and customs are the chief sources of revenue. Foreign affairs are administered very inefficiently, frequently without regard to international law, and the country is held together largely through the jealousy of foreign powers that seek to attain the preëminence of influence. "The Sick Man of Europe" is the term commonly used in referring to the Sultan, owing to the instability of his government.

EDUCATION. Scarcely any progress has been made in education, and comparatively few of the adult population are able to read and write. Those who enjoy educational advantages belong to the wealthy class. No reliable statistics upon the state of education have been published. Since the Koran commends the instruction of youth, free public schools are maintained under government grants, though the courses and the methods of teaching are primitive. The number of ele-

mentary schools is placed at 2,180. A number of colleges for higher education are connected with the mosques. Many missionary schools are maintained, and the parochial schools and Christian seminaries are quite numerous. The number of mosques in the empire is placed at 2,125, of which about one-sixth are in Constantinople.

INHABITANTS. The population of European Turkey is made up largely of Greeks, Bulgars, Turks, and Albanians, though other races are represented. In Asiatic Turkey the Turks are in a great majority, but the inhabitants include many Arabs, Armenians, Circassians, Greeks, Kurds, and Jews. Not more than one-half of the people are Mohammedans, the remainder being Armenians, Jews, Orthodox Greeks, Roman Catholics, and Protestant Christians. Mohammedanism is the national religion, but all faiths are tolerated, though not with the spirit of liberality.

Constantinople, on the Bosporus, in Europe, is the capital and largest city of the Ottoman Empire. Adrianople, Monastir, Salonica, and Janiva are other important cities in European Turkey. Among the chief cities of Asiatic Turkey are Damascus, Jerusalem, Beyrout, Rhodes, Tokat, Balikesri, Smyrna, Bagdad, Aleppo, and Scutari. Tripoli, Alexandria, Cairo, Bengazi, and Port Said are the leading cities of African Turkey.

LANGUAGE AND LITERATURE. The Turkish language is a branch of the Turanian family of tongues and is allied to the dialect spoken by the Finns and the Hungarians. Geographically it belongs to a strip of country about 300 miles wide, which extends from the Adriatic Sea eastward to the western border of Manchuria. The western branch is generally known as *Osmanli*, and is enriched by words taken from the poetry and history of Persia. It has been influenced to a considerable extent by the Arabic. During the Christian era it came to be modified by the introduction of Greek and European words and modes of expression. Eastern Turkish is the name applied to the language spoken by the Turkish tribes that form a large element in the region lying east of Asia Minor. While the Turks have a considerable literature, many of their works have been translated from the Arabic, Persian, and European languages. A majority of the original writings are devoted largely to comments on the Koran, Turkish law, history, geography, astronomy, and Turanian philology. Ahmed Vefik Pasha (died in 1893) published a dictionary of the Turkish language, and may be said to have thus rendered a service of great value to his race. While the modern writers are not numerous, they include the historian Javdet Pasha, the poet Jevad Pasha, the literary critic Ebuzzia Tevfik, and the essayist Mualiim Naji.

HISTORY. The Turkish Empire was founded by the Ottoman Turks, who occupied a region of the Altai Mountains and in the 6th century A. D. began to move westward. They were subdued by the Saracens in the 8th century and reduced to slavery, but learned from their conquerors better arts of war and embraced the Mohammedan religion. In the 13th century they formed an alliance with the Seljuk Turks in a war against the Mongols, receiving in return for their services a grant of land in Asia Minor. Othman or Osman, an Oghuzian Turkoman, became Emir of Iconium in Asia Minor after the death of the Seljuk Sultan, and proclaimed himself Sultan in 1300. He conquered Nicaea and other districts, thus founding the empire of the Ottoman Turks in the region formerly occupied by the Saracens, Mongols, and Seljuks, and at his death, in 1326, was succeeded by his son, Orkhan.

The second son of Orkhan succeeded to the throne as Amurath I. in 1360, and the following year captured Adrianople and made it the capital of European Turkey. His successors added considerable territory in Europe, and Mohammed II. finally conquered the Byzantine Empire by capturing Constantinople on May 29, 1453. The city has since been the seat of the Sublime Porte or Turkish government. Later Mohammed added Bosnia, Albania, Servia, and Greece to the Turkish Empire, and his grandson, Selim I., succeeded to the throne in 1517 and conquered Syria and Egypt. Turkey reached its greatest power and military importance under Solyman II., who reigned from 1519 to 1566. He captured Rhodes in 1523, conquered half of Hungary in 1526, and made Mesopotamia, Bagdad, Georgia and Moldavia tributary. His march into Europe was unimpeded by formidable resistance until he came in contact with Charles V. of Germany, who defeated him with great loss at Vienna in 1529. Since then there has been a continuous decline in Turkish power.

The allied fleets of Venice and Spain defeated the Ottoman fleet in the Battle of Lepanto, in 1571, thus destroying its naval importance, and a second defeat was administered to the Turks at Vienna in 1683 by the German army under Montecuccoli. Subsequently they were defeated by Sobieski at Vienna and by Prince Eugenè at Zenta, in 1697. In the reign of Catherine II. of Russia, the Russian army under Romanzoff defeated the Turks in various battles in the Crimea, and by the peace treaty of 1774 Turkey lost the Crimea and a large region now included as territory of southern Russia. Napoleon deprived the Turks of Egypt in 1799, but that region was restored to the Sultan by English intervention in 1800. Russia, demanding a more distinct protectorate over the Christians in Turkey, soon after made consecutive additions of Turkish territory by annexing Moldavia, Bessarabia, and the mouth of the Danube.

In 1821 the Greeks began a war for independence, and the cruelties perpetrated by the Turks upon Greek Christians finally induced Russia, France, and Great Britain to intervene. The

allied fleets of the three nations defeated the Turks in a naval battle at Navarino on Oct. 20, 1827, and two years later the independence of Greece was recognized. In the meantime the Janizaries had revolted and were massacred without mercy at Constantinople in 1826. Mehemet Ali, Pasha of Egypt, revolted against the Sultan in 1831, but the overthrow of Turkey was averted by the intervention of Russia in 1833, and in 1840 Turkey was admitted among the European states as a treaty power. In 1853 the Crimean War broke out, in which Russia was pitted against Turkey, but the latter was assisted by France and England. It terminated favorably to the allied armies and by the treaty at Paris on March 30, 1856, Russia lost Wallachia, Moldavia, and other frontier territories.

Bosnia and Herzegovina rebelled against Turkish misrule in 1875 and Bulgaria did likewise in 1876. In the armed contests that followed, Turkish soldiers massacred Christians without mercy, which caused all of Europe to become aroused. Russia declared war in April, 1877, granting at the same time permission to Austria to occupy Bosnia and Herzegovina. All the European nations manifested a willingness for Russian success, owing to the oppressive measures inflicted by Turkey upon the Christians, and Rumania joined Russia by declaring its independence on May 22, 1877. The Russians were successful at Kars, and completely annihilated the Turks at Plevna, compelling them soon after to accept the Treaty of San Stefano. The Treaty of Berlin, concluded on July 13, 1878, erected Bulgaria into a principality, annexed Bessarabia to Russia, empowered Austria to occupy Bosnia and Herzegovina, and declared the independence of Servia, Rumania, and Montenegro. In 1881 the French established a protectorate over Tunis, and in the same year Turkey ceded all of Thessaly and a part of Epirus to Greece. A revolution in Eastern Rumelia overthrew the government at Philippopolis, in 1885, and that province was annexed to Bulgaria. In 1897 a war broke out between Greece and Turkey, which proved disastrous to the former.

Abdul-Hamid II., born Sept. 22, 1842, succeeded to the throne on Aug. 31, 1876. His reign of 33 years was a disastrous period to the country, since it lost much in territory and prestige among the nations. Besides the Russo-Turkish War of 1877 and the Greco-Turkish War of 1897, many insurrections and massacres of Christians disturbed the peace of the country. In 1900 the relations between Turkey and the United States became somewhat unfriendly, owing to the former refusing to pay an indemnity of $90,000 due American subjects, but the matter was adjusted after the United States warship *Kearsarge* and the training ship *Dixie* were sent to Smyrna. The Sultan sought to pacify his constituents and the dependencies in 1908 by restoring the constitution of 1876, but Bulgaria declared its independence and Austria officially annexed Bosnia and Herzegovina. In 1909 an element known as the *Young Turks* revolted, captured Constantinople, and deposed the ruling sovereign. His brother, Mohammed Rechad Effendi, was proclaimed Sultan by the parliament as Mohammed V. Italy annexed Tripoli by proclamation in 1911. The Balkan War of 1913 caused Turkey to lose most of the territory in Europe. In 1914 it became involved in the World War as an ally of Germany and Austria-Hungary. After the war the people revolted against the Sultan and Mustapha Kemal was elected president, in 1923. See **War.**

TURKEY BUZZARD. See **Vulture.**

TURKOMANS (tûr'kō-mąns), a nomadic Tartar people of Asia, occupying the region bounded by the Caspian Sea and the Sea of Aral, Persia, Afghanistan, and the khanates of Bokhara and Khiva. They include numerous tribes or clans, each speaking a slightly different dialect, and may be said to constitute no single nation. Most of the nomadic tribes are warlike.

TURKS, a numerous race of people of the Turanian family, supposed to have had their original seat in Turkestan. They were finally driven westward by the Mongolians, with whom they warred many centuries. Their possessions in Central Asia were entirely overrun by Genghis Khan in the 13th century. A portion of the Oghuzian Turkomans had been enslaved by the Seljuks, also a Turkish tribe, and, by allying themselves with the latter in a defensive war against the Mongols, they secured a foothold in Asia Minor, whence they spread over Persia and Syria. Othman or Osman founded the Ottoman Empire at the close of the 13th century, and his descendants are known as the Osmanli Turks. Other divisions of the Turks include the Turkomans, the Turkish nomads, the Tartars, and the Yakuts of the Lena River. The Turks are variously estimated, statisticians placing their numerical strength between 15,000,000 and 20,000,000. The Ottoman Turks, most of whom are in Europe, show a closer resemblance to European people than to the Asiatic Turkish tribes, who more nearly resemble the Mongolians in the color of the skin and the contour of the face. Most Turks profess the Mohammedan faith, but those in Siberia are largely members of the Greek Catholic Church, and those in or near China are Buddhists. The Yakuts of Siberia profess Shamanism, which is closely related to fetichism. Though the dialects are somewhat different, they speak a language generally understood by the different classes. The Turkish tribes include the Bashkirs between the Irtish and the Volga and the Kalmucks resident in the region of the Don.

TURKS ISLANDS, an island group belonging to the Bahama chain. It is situated southeast of the Caicos Islands, about 90 miles north of Hayti. Both groups of islands are under the governor of Jamaica. The principal settlement is on the island of Grand Turk, which

is about seven miles long and two miles wide. The two groups have an area of 224 square miles and a population of 4,740. Salt, sponges, and fruits are the principal products. Much of the surface is barren.

TURMERIC (tûr'mĕr-ĭk), the tuberous root of a herbaceous, perennial plant belonging to the ginger family. The plant is native to Southern Asia and is cultivated extensively in that region and on the islands of the Indian Ocean. Turmeric is used as a condiment, in medicine, and as a dyestuff. It produces a yellow stain of great brightness, thus making it valuable in coloring varnishes and in preparing curry powder. Turmeric is cultivated in a light and well-watered soil and the plant is propagated by offsets. An acre of fertile ground yields about 200 pounds of the product. The root is prepared for the market by cleaning and drying it in an oven. *Long turmeric* is a species that yields a root two or three inches long, and *round turmeric* has roots somewhat shorter but more bulky. The roots have a yellowish color.

TURNER (tûrn'ĕr), **Joseph Mallord William,** landscape painter, born in London, England, April 23, 1775; died Dec. 19, 1851. He was the son of a barber, with whom he worked for some time, but in 1789 entered the Royal Academy as a student. His study and sketching were so successful that he was able to make numerous exhibits, and in 1799 became an associate of the Royal Academy, of which he was made a full member in 1802. His early paintings were largely landscapes in water colors, but on being made an academician he devoted himself to oil painting, and in the course of a half century exhibited 200 excellent productions. He traveled in France, Germany, Italy, Austria, and other countries of Europe for the purpose of coming in contact with the works found in the principal galleries, his first tour being in 1802 and his second in 1804. His contributions to the Royal Academy include 259 pictures and about 19,000 drawings. All his pictures and sketches were bequeathed by his will to the nation and were placed in the Turner Gallery, a department of the National Gallery. He was buried in Saint Paul's, beside Sir Joshua Reynolds. Among his most noted paintings are "Falls of the Clyde," "Sun Rising Through Vapor," "Dutch Boats in a Gale," "Decline of the Carthaginian Empire," "Crossing the Brook," "Burial at Sea," "Approach to Venice," "Bridge of Sighs," and "Dido Building Carthage." He painted illustrations for poems by Scott, Rodgers, Byron, and others. John Ruskin wrote an exhaustive analysis of his works in "Modern Painters."

TURNER, Nat, Negro slave, born in South Hampton County, Virginia about 1800; died Nov. 11, 1831. He claimed from childhood to have been inspired to free his race. In 1828 he announced that he would receive a sign at the time the race was intended to rise and slay his enemies. He accepted the eclipse of the sun in February, 1831, as such a sign. In the summer of that year he organized a force of about fifty followers, with whom he went from house to house and killed 53 whites. Soon after he was confronted by a force of men and put to flight, but he was captured after hiding about six weeks. Afterward he was convicted of murder and hanged at Jerusalem, Va. Seventeen of his followers were captured and legally executed. The movement is commonly known as the *Nat Turner Insurrection.*

TURNER, Sharon, historian, born in London, England, Sept. 24, 1768; died Feb. 13, 1847. He studied for the law, but, after practicing a short time, he began to devote his attention to literature. His first celebrated work was published in 1805, entitled "History of the Anglo-Saxons." Although this production contains some imperfections, it gave the writer a permanent place in English literature. Other works from his pen include "History of Edward VIII.," "History of England from the Norman Conquest to 1509," "Reigns of Edward VI., Mary, and Elizabeth," and "Sacred History of the World."

TURNIP (tûr'nĭp), a biennial plant of the mustard family, which is cultivated for its fleshy, globular, edible root. It is a common vegetable in gardens and fields, being alike wholesome for culinary use and as a food for cattle. The seed is sown in temperate regions in June, usually broadcast, and the roots mature in ample time before the appearance of frost. In field culture the seeds are drilled by a machine in rows, thus facilitating cultivation by machinery. Many choice species have been obtained by propagation. Some are oblong rooted and others are globular, the latter being chiefly favored for table use. Among the chief species are the early Milan, white egg, early snow, flat Dutch, red-top, long white French, monarch Swede, and sweet German turnips. The *Swedish turnip,* or *ruta-baga,* is an allied plant and is cultivated mostly for cattle food. It has about 86 per cent.

WHITE TURNIPS. FLAT DUTCH TURNIPS.

of water, while the common turnips have 90 per cent. Turnips were a favorite vegetable in the times of the Greeks and Romans, but the species have been greatly increased in size and fleshiness by careful culture.

TURPENTINE (tûr'pĕn-tīn), an oleoresin exuding from several species of coniferous trees. The commercial product is secured chiefly from the pine tree. Crude turpentine flows naturally or from incisions made about five to six inches from the root of the tree to a height of about six feet. The several kinds of oil differ according to the species of trees from which they are derived. Turpentine has a density of about .87 and boils at about 162°. It is produced in large quantities in North Carolina, where it is obtained from the sap of the long-leaved pine. The larch tree yields the so-called *Venice turpentine,* a superior product. *Strassburg turpentine* is derived from the silver fir, *German turpentine* from the Scotch fir, and *Canada turpentine* from the balsam and several other species of fir. The trees yield the largest flow of sap in the spring, when the best grade is obtained, and the inferior quality comes from the hardened gum forming at the sides of the cut made by the hacker. *Oil of turpentine* is made by distilling the sap in a copper vat, which is connected with the worm of the still. The volatile parts rise and are condensed into *spirits of turpentine,* while the hard part remaining forms the resin of commerce employed in making soap. The oil, or spirits, of turpentine is used in medicine, in making varnishes and paints, and for dissolving resins.

TURPIE, David, statesman, born in Hamilton County, Ohio, July 8, 1829; died April 21, 1909. After attending the public schools, he began to study law, and in 1849 was admitted to practice at Logansport, Ind. In 1854 he became judge of the court of common pleas and was made judge of the circuit court in 1856, which office he resigned. He was an influential member of the State Legislature for several years. He was elected United States Senator in 1863 to fill a vacancy. From 1874 to 1875 he was speaker of the Indiana house of representatives and was made a commissioner to revise the laws of the State, serving in that capacity from 1878 to 1881. He was appointed United States district attorney for Indiana in 1886, but the following year again entered the United States Senate, and was reëlected to the same position in 1892. At the close of his term, in 1899, he was succeeded by Albert J. Beveridge. Turpie was an influential and able statesman and was a recognized leader of the Democrat party.

TURQUOISE (tûr-koiz'), a precious stone, having a blue or bluish-green color. It is composed essentially of a hydrated phosphate of alumina, with small proportion of oxide of iron and sulphate of copper, to which it owes its color. Turquoise is found in several regions of Persia, where it is used for ornamenting arms, charms, and girdles. The best grades sold in the market are obtained in the mountains near Nishapur, Persia, but turquoise of a good quality is found in Mexico. It is so called because the mineral was first brought to Western Europe by way of Turkey. The finest turquoise gems are owned by the Shah of Persia, as only those of an inferior quality and less value are exported.

TURTLE (tûr't'l), the name applied commonly to a class of reptiles that frequent both land and water, but more properly to the large marine forms. In many instances it is used interchangeably with the word tortoise. In fact, turtle is the common name of both genera, and the term turtle has particular reference to the *green turtle.* This animal, when fully developed, is six to eight feet long and weighs from 700 to 850 pounds. The shell is usually smooth and colored greenish or olive. This reptile is highly valued for the delicacy of its flesh, which is used chiefly for turtle soup. It feeds on a marine plant known as turtle grass, but also on seaweed. Two species are well known, one of which inhabits the warm part of the Atlantic, and the other, the warmer waters of the Pacific. See **Tortoise.**

TURTLEDOVE, a class of birds that are allied to the domestic pigeons. They are somewhat smaller and more elegantly formed than the common doves. The *Carolina turtledove* is an American species. Its length is thirteen inches, with an alar extent of eighteen inches. It has the upper mandible slightly bent down, the tail is rounded, and it has a grayish color tinged with red. The *common turtledove* is distributed in many countries of Europe, Asia, and Africa. It is slightly smaller than the Carolina turtledove, being about ten inches long. It migrates to the warmer parts on the approach of winter, but returns to nest early in the spring. The nests are built of twigs, in which two cream-white eggs are deposited in May. Both male and female alternate to sit on the nest. They are noted for their beautiful color of grayish-brown, for their cooing, and for the affection to their mate and the young. They pair for life. The *collared turtledove* is native to Palestine and North Africa. It is about ten inches in length. The general color is gray tinted with red and greenish-brown, the tail is short, and it has a black collar on the back of the neck. These birds are hunted for their flesh, for which large numbers are killed in autumn.

TUSCALOOSA (tŭs-kà-lōō'sà), a city in Alabama, county seat of Tuscaloosa County, on the Black Warrior River, 50 miles southwest of Birmingham. Communication is furnished by the Mobile and Ohio and the Louisville and Nashville railroads. The surrounding country is fertile, producing tobacco, cotton, and cereals. In its vicinity are productive deposits of coal, iron ore, and fire clay. It has steamboat navigation

on the Black Warrior River, which is navigable to Tuscaloosa. The city was formerly the State capital, and is now the seat of a number of fine educational institutions, including the Tuscaloosa Business College, the Central High School, and the Institute for Training Colored Ministers. It is the seat of the University of Alabama. The Alabama Insane Hospital, several fine public schools, and a number of churches are among the other important buildings. Among the manufactures are bread, pig iron, cast iron pipes, cigars, clothing, and machinery. Electric lighting, waterworks, and telephones are among the facilities. It was settled in 1812 and incorporated in 1816. Population, 1920, 11,996.

TUSCANY (tŭs'kȧ-nĭ), formerly a grand duchy, but now one of the sixteen departments of Italy. The area is 9,304 square miles. It is situated on the Mediterranean, southwest of the Apennines, and embraces a productive part of Italy. It is divided into the provinces of Leghorn, Arezzo, Florence, Grosseto, Siena, Lucca, Pisa, and Massa e Carrara. The coast régions are level, the interior is undulating, and the western part is mountainous. Practically all the drainage is toward the southwest, the principal rivers being the Arno, Ombrone, and Cecina. It has fine vineyards and orchards and a large production of raw and manufactured silk. The chief cereals include wheat, corn, barley, and rye; the live stock, cattle, horses, mules, and sheep; and the fruits, grapes, olives, oranges, and dates. Among the manufactures are wine, straw goods, olive oil, silk textiles, porcelain, pottery, furniture, and marble products.

Tuscany formed a part of ancient Etruria, which was annexed to Rome in 351 B. C. After the fall of the Western Empire, it passed successively to the Ostrogoths, Greeks, and Lombards. Charlemagne and other Germanic emperors governed it until in the 12th century, when it became divided into several minor principalities. In 1567 the title of Grand Duke of Tuscany was conferred by Pope Pius V. on Cosmo de' Medici, whose authority was confirmed some time after by Maximilian II. A French army invaded it in 1799. The kingdom of Etruria was formed by Napoleon in 1801, but was annexed to the French Empire in 1808 as a grand duchy, Elisa, sister of Napoleon, becoming grand duchess. In 1860 it was made a part of United Italy under Victor Emmanuel. Since then extensive railroad building has been promoted and industrial and commercial enterprises have been fostered. Florence is the capital and largest city. Other cities of note include Pisa and Leghorn, the latter being the chief seaport. Population, 1922, 2,656,382.

TUSCARORAS (tŭs-kȧ-rō'rȧz), an Indian tribe of North America, originally one of the Six Nations of the Iroquois. The name means *shirt-wearer* and is thought to have been assumed after the settlement of America by Europeans. They occupied the region now included in North Carolina at the time of its settlement. when they had fifteen towns on the Tar and Neuse rivers and had 1,250 warriors. In 1711 they united to massacre the whites, but were defeated in the Battle of the Neuse on Jan. 28, 1712. Subsequently the hostile portion fled to New York, where they still occupy a reservation on Lake Oneida, but a small part remained friendly and continued to occupy their lands. The government purchased the land held by those remaining in 1829. Most of the Tuscaroras favored the English in the early settlements, but subsequently joined the American Revolutionary forces.

TUSCULUM, a city of ancient Latium, on the Alban range of hills, 15 miles south of Rome. Its citizens received the Roman franchise as early as 378 B. C., and it was long a favorite residence of the wealthy Romans. Cicero maintained a villa at Tusculum; and in its vicinity are the remains of a citadel, a theater, and a Forum. It was the birthplace of the elder Cato and many other prominent Romans.

TUSKEGEE (tŭs-kē'gē), a city of Alabama, county seat of Macon County, on the Tuskegee Railroad, about 40 miles east of Montgomery. It is surrounded by a rich cotton-growing region and has a growing trade in farm produce and merchandise. The manufactures include flour, cotton-seed oil, furniture, butter, tile, earthenware, and machinery. It is celebrated as the seat of the Tuskegee Normal and Industrial Institute. Other educational institutions include the Alabama Military Institute, the Alabama Normal School, and the Alabama Conference Female College. Population, 1920, 2,475.

TUSKEGEE NORMAL AND INDUSTRIAL INSTITUTE, an institution established at Tuskegee, Ala., in 1881, for the training of colored persons of both sexes. Instruction is given in sciences, agriculture, carpentry, blacksmithing, brick masonry, domestic economy, shoemaking, engineering, dressmaking and millinery, printing and publishing, nursing, and many other arts and trades. The purpose is to give its students a careful training in the industrial arts, as well as the elements of an education, and to elevate them in their moral and material conditions. This institution has about 70 buildings, 2,650 acres of land, and 1,250 head of live stock. The library contains 55,500 volumes, and the value of all property is placed at $1,750,000. Tuition is free and many students can work a large part of their way through the institution. Students representing about thirty of the states are in attendance, and others enrolled come from Cuba, Porto Rico, Jamaica, and Africa. The faculty of professors and instructors numbers about 243, and the attendance is 3,025 students. See **Washington, Booker T.**

TUSSOCK MOTH (tŭs'sŭk mŏth), the name given to a large family of caterpillars, so called from the presence of tufts of hairs upon the body. These insects have a dull color and in some species the female is wingless. It lays its

eggs soon after leaving the cocoon, but dies shortly after. In about three weeks the larvae make their appearance, when they feed voraciously upon leaves, especially such fruits as the apple and pear. They drop to the ground when disturbed, or suspend themselves by a silken thread. Spraying the affected trees with arsenites often rids them of these pests.

TUTANKHAMEN (tŭt-ŏnk'ä-mĕn), a king of ancient Egypt, who is supposed to have reigned about 1358 to 1350 B.C. His elaborate tomb was found in 1922 near Luxor by an expedition financed by Lord Carnarvon of England, assisted by Howard Carter, an American. This tomb is located in the Valley of the Tombs of Kings, where not less than 500 burial places have been discovered and platted. Treasures of great value were found in the tomb of Tutankhamen, consisting of robes, candlesticks, furniture, precious gems, and other comforts and conveniences used in life.

TUTUILA. See **Samoan Islands.**

TWAIN, Mark. See **Clemens, S. L.**

TWEED, a river in the southern part of Scotland, rising in Peebleshire, and, after a general course of 97 miles toward the east, flows into the North Sea at Berwick. It is famed for its beautiful scenery and for its connection with the history and literature of Scotland. The chief tributaries include the Eden, Gala, Teviot, Leader, and Till. It forms that part of the boundary between Scotland and England which lies between the Cheviot Hills and the North Sea, where its course is toward the northeast. Steamboats ascend it only a few miles from the mouth. The fisheries are important.

TWEED, William Marcy, public man, born in New York City, April 3, 1823; died there April 12, 1878. After securing a public school education, he entered the furniture factory of his father, and soon became connected with the city government. He was alderman from 1852 to 1853, congressman from 1853 to 1855, school commissioner from 1856 until 1857, and senator in the State Assembly from 1867 to 1871. In 1870 he was appointed commissioner of public works and while holding that position organized the famous Tweed Ring, which appropriated large sums of public money for private purposes. He escaped from prison and fled to Spain, but was returned by the Spanish government and was again imprisoned. His death occurred while he was in confinement.

TWEEDS, a kind of twilled fabric, so named from the Tweed River, in Scotland, where it was first manufactured. It is made entirely of wool, or partly of cotton and shoddy. This product has an unfinished surface and is used largely for making men's clothing.

TWELFTH-DAY, the name given to the twelfth day after Christmas, known as the festival of Epiphany. The evening of this day is called *Twelfth-Night* and is observed in many countries by social rites and ceremonies. Usually a cake containing a bean is made, known as a *twelfth-cake,* and the person who receives the piece containing the bean is known as the king of the festival. Shakespeare named a comic play from this night.

TWELVE TABLES, Law of the, a written code of law promulgated in ancient Rome. It was the earliest systematic statement of the Roman law and was prepared on a demand made by the plebeians. This class demanded a written code for the reason that the judges belonged exclusively to the patrician class, hence they were able to interpret the unwritten law as might best suit their convenience. Accordingly, ten magistrates were elected to write the laws, in 452 B. C., and before the end of the following year ten tables were approved by the popular assembly. Soon after two other tables were completed. The Twelve Tables were regarded as a guarantee of personal liberty. They did not constitute new legislation, but comprised a compilation of the unwritten law that had long existed.

TWICKENHAM (twĭk'ĕn-ăm), a town of England, on the Thames River, 11 miles southwest of London, with which it is connected by railway. It abounds in fine scenery and numerous suburban villas, and the surrounding district is noted for its sylvan beauty. Twickenham is famous as the home of Pope, whose monument occupies a place in the parish church. Population, 1921, 24,682.

TWIN FALLS, county seat of Twin Falls County, Idaho, 112 miles southeast of Boise, on the Oregon Short Line Railroad. It is in a fertile farming section and has a large trade. The features include the courthouse, high school, Masonic Temple, federal building, and electric railways. It has manufactures of sugar, flour, bread, and machinery. Population, 1920, 8,324.

TWILIGHT (twī'līt), the glow of light after sunset and before sunrise, though popularly the term is applied only to the evening twilight, the early morning light being called *dawn.* It is caused by the refraction and reflection of the sun's rays by the atmosphere; hence, in the absence of an atmosphere, there would be no twilight, but light would begin abruptly at sunrise and cease immediately at sunset. The refracted rays continue to reach the earth after the sun has truly set, and, when these rays cease, the sunlight continues to illuminate the clouds and upper strata of air, which is exemplified by the sun shining on the summits of lofty mountains long after the direct rays have disappeared from the view of inhabitants of the plains below. Night ensues only after the sun has sunk so low that reflected and refracted light ceases to reach us, the same phenomenon occurring before sunrise, though in a reverse order. Twilight occurs only when the sun is less than 18° below the horizon, from which it is evident that its duration in ordinary latitudes varies considerably with the season of the year. No true night occurs in the latitude of Greenwich for a month

before and after the summer solstice, but twilight characterizes the period constantly from sunset to sunrise. This is due to the circumstance that the sun is near the Tropic of Cancer and does not descend so much as 18° below the horizon. The twilight is longest toward the poles, where the night of six months is shortened by an evening twilight of about fifty days and a morning twilight of equal length. Twilight is shortest at the Equator. In the latitude of Toronto and New York City the average length of twilight is about one and a half hours, the duration being greatest in midsummer, when it is more than two hours.

TYLER (tī'lẽr), a city in Texas, county seat of Smith County, 98 miles southeast of Dallas, on the Saint Louis Southwestern and the International and Great Northern railroads. It is surrounded by a fertile farming, stock-raising, and fruit-growing region. The principal buildings include the county courthouse, the United States government building, the Cotton Belt Hospital, the Texas College, the Tyler College, and a railroad hospital. Among the manufactures are canned fruits, leather, tile, furniture, brooms, cigars, clothing, coffins, pottery, ironware, and machinery. The city has electric and gas lighting, street pavements, waterworks, telephones, and street railways. It was settled in 1844 and incorporated as a city in 1875. Population, 1900, 8,069; in 1920, 12,085.

TYLER, John, tenth President of the United States, born in Greenway, Va., March 29, 1790; died in Richmond, Jan. 18, 1862. He was the son of Judge John Tyler, Governor of Virginia, and in 1807 graduated from William and Mary College. At college he displayed a strong interest in ancient history and fondness for poetry and music, being skilled as a performer on the violin. He was admitted to the bar in 1809 and two years later became a member of the State Legislature. His ability as a persuasive speaker became recognized in supporting the administration of Madison, especially the course of the latter which finally promoted the War of 1812. After serving continuously in the Legislature until 1816, he was chosen a member of Congress, and was reëlected in 1818 and 1820. In 1823 he again entered the Virginia Legislature, and two years later became chancellor of William and Mary College, but was chosen Governor of Virginia in the same year. He was elected to the United States Senate in 1826, where he supported Andrew Jackson in his administration policy. but later voted for the Clay resolution to censure the President for removing the deposits from the United States Bank.

JOHN TYLER.

In 1825 Tyler became the candidate for Vice President on the Whig ticket, receiving 47 electoral votes, but, as no candidate had a majority in the electoral college, Richard M. Johnson, of Kentucky, was elected to that office by the Senate. He resigned his seat in the Senate, owing to the Legislature of Virginia instructing him to vote for expunging the resolutions of censure upon President Jackson, and shortly after was chosen to the Virginia Legislature. In 1840 he was nominated by the Whigs for Vice President, with General Harrison as President, receiving 234 electoral votes to 48 cast for Richard M. Johnson, the Democratic opponent. On the death of President Harrison, April 4, 1841, he became President of the United States.

The more important events in the administration of Tyler include the Ashburton Treaty, the treaty with China, the termination of the Indian war in Florida, the protective tariff law of 1842, and the annexation of Texas in 1845. His veto of the bill favorable to the United States Bank, then a favorite measure of the Whigs, caused a number of his cabinet officers to resign. He was president of the peace convention in 1861, whose object was to effect a compromise between the North and the South. Subsequently he supported the Confederate cause, serving as a member of the Confederate Congress at the time of his death. He was buried in Hollywood Cemetery, Richmond. His wife, Letitia Christian (1790-1842), was the daughter of Robert Christian, a planter of Virginia.

TYLER, Moses Coit, educator, born in Griswold, Conn., Aug. 2, 1835; died Dec. 26, 1900. He studied at Yale University, where he graduated in 1857, and subsequently attended the Andover Theological School. In 1860 he entered the ministry of the Congregational Church, holding important charges at Owego and later at Poughkeepsie, N. Y., and subsequently was professor of English literature at the University of Michigan. He became instructor in American history at Cornell University in 1881, where he held the chair in that branch for a number of years. His educational work and literary efforts were alike impressive. Among his books are "A Literary History of the American Revolution," "Three Men of Letters," "History of American Literature During the Colonial Time," "Glimpses of England," and "The Brawnville Papers."

TYLER, Wat. See **Watt Tyler.**

TYLER, William Seymour, clergyman and author, born in Hartford, Pa., Sept. 2, 1810; died Nov. 19, 1897. He studied at Amherst College and the Andover Theological Seminary, and was professor of Latin and Greek at Amherst from 1836 to 1847. In the latter year he became the professor of Greek only. He twice visited Europe and the East, where he studied to enlarge his ability as a teacher of languages, a branch of study taught by him with success for

more than fifty years. His writings and annotated works include "The Germania and Aricola of Tacitus," "Theology of the Greek Poets," "History of Amherst College," "Plato's Apology and Crito," nine books of the "Iliad," "Demosthenes's Philippics and Olynthiacs," "Histories of Tacitus," and "Prayer for Colleges."

TYNDALE (tĭn'dạl), **William,** reformer and martyr, born in Gloucestershire, England, about 1484; suffered martyrdom Oct. 6, 1536. He first studied at Magdalen Hall, Oxford, and afterward at Cambridge. In 1521 he was ordained to the priesthood and soon after became chaplain and domestic tutor in the household of Sir John Walsh, in Gloucestershire. He began the translation of the New Testament into English while in the home of Sir Walsh, but, finding publication impossible in England, he went to Germany in 1524. After visiting Luther at Wittenberg, he took up his residence at Cologne, but later settled in Worms, where his first edition of the New Testament in English was published in 1526. Large numbers of the completed work were conveyed to and sold in England, where it was condemned by the government, but German printers continued to put out new editions. The clergy of England prohibited the circulation of it, and seven books against Tyndale were written by Sir Thomas More. The English government plotted to secure the arrest of Tyndale, who had taken up his residence in Antwerp in 1530, where he was finally arrested and imprisoned in the castle of Vilvoorden, about six miles from Brussels. A commission condemned him as guilty of heresy and he was put to death by strangling and his body was burned afterward. At his birthplace in Gloucestershire is a monument to his honor, erected in 1866. Besides translating the New Testament, he wrote "The Obedience of a Christian Man" and translated the first five books of the Bible, the Pentateuch.

TYNDALL (tĭn'dạl), **John,** physicist and author, born in Leighlin Bridge, Ireland, Aug. 21, 1820; died in Haslemere, England, Dec. 4, 1893. He first studied and practiced surveying and engineering, and in 1847 became a teacher in Queenwood College. In 1848 he entered the University of Marburg, Germany, where he studied an advanced course in the sciences under Bunsen and other eminent teachers. Subsequently he took a course of instruction in the laboratory of Magnus at Berlin, and in 1853 was elected professor of natural philosophy in the Royal Institution of Great Britain. He joined Professor Huxley in visiting the glaciers of Switzerland in 1856, made extensive researches in magnetism and radiant heat, and in 1872 proceeded on a lecturing tour in Canada and the United States. The proceeds of 35 lectures delivered in America were placed in the hands of the committee to be devoted to aid students in making original research in the sciences.

Tyndall became president of the Birmingham and Midland Institute in 1877, and subsequently served as the scientific adviser of the lighthouse authorities and of the board of trade. Having been a brilliant writer and effective lecturer, his writings are both numerous and valuable. He was granted degrees by Cambridge, Edinburgh, and Oxford, and received recognition from many important scientific associations. His researches have enriched knowledge in the field of radiant heat, magnetism, sound, light, electricity, and the properties of air and water. His writings embrace "Heat as a Mode of Motion," "Glaciers of the Alps," "Notes on Light," "Lectures on Electrical Phenomena," "Floating Matter of the Air," "Faraday as a Discoverer," "Forms of Water in Clouds and Rivers, Ice and Glaciers," "Diamagnetism and Magneto-Crystallic Action," and "New Fragments."

TYNE (tīn), a river in the northern part of England, formed by the North and the South Tyne. The general course is toward the east, forming part of the boundary between Durham and Northumberland, and it discharges into the North Sea at Tynmouth. The length of the river from the junction is only 35 miles, but it is an important highway of commerce and is navigable to Blaydon, about 18 miles. The Derwent and the Team flow into it.

TYNG (tĭng), **Stephen Higginson,** clergyman and author, born in Newburyport, Mass., March 1, 1800; died Sept. 4, 1885. He was a son of Dudley Atkins Tyng (1760-1829), who was noted as a jurist. He graduated from Harvard University in 1817, and, after taking orders in the Episcopal Church, began a successful pastorate at Georgetown, D. C. In 1829 he secured a charge in Philadelphia, where he remained sixteen years, and later became rector of Saint George's Church, New York, serving efficiently for 33 years. He was famous as a pulpit orator and platform speaker, organized many Sunday schools, and wrote a large number of excellent lectures and treatises. He edited for some time the *Episcopal Recorder* and the *Protestant Churchman.* His writings include "Forty Years in Sunday School," "Law and Gospel," "Esther, Queen of Persia," "Prayer Book Illustrated by Scripture," and "Captive Orphan."

TYPE (tīp), a piece of metal or wood, bearing on its upper surface a cast of engraved character for use in printing. Types were first made of wood, the letters being cut in various styles of writing, such as the Gothic, Roman, and Italic. Gutenberg overcame the objections to wooden types by using brass, but since his time movable types have been vastly improved and cheapened and printing has been lessened correspondingly in price. An alloy composed of lead, tin, and antimony is now used in type making. The larger types contain the largest proportion of lead, while the smaller need to be harder to resist wear and are formed with a greater proportion of antimony. Copper and nickel are used to cover the face of types designed for various purposes, the copper rendering them harder

and the nickel serving to overcome the action of chemicals in the ink. An electrotyping process is employed in the larger printing offices to make copies of the type for printing, which is described in the article treating of electrotyping.

Formerly types were made by hand, and later a hand-casting process came into use, but now types are cast largely by machinery. It is possible to make 1,500 to 3,000 types by the hand-casting method in a day, though by the machine process fully four times that number can be made. In type making a mold is employed, into which the molten metal is cast. Different sizes of molds are used, according to the type desired. They have the form for a letter sunk into a copper plate, the impression being made by a well-tempered steel punch, containing the design of the letter in relief. The plate of copper having the impression is placed at the end of the mold, into which the molten metal is forced by an air pump, and the type is afterward thrown out by the mold being opened. Imperfect types are remelted and those having perfect form and a well-cast letter are finished by polishing on a marble slab. Types are cast according to a point system now generally adopted. They have a uniform height of .981 of an inch, and are usually nicked on the lower side for the convenience of the compositor.

Below is a table of comparison giving the type and the measurement by points and names:

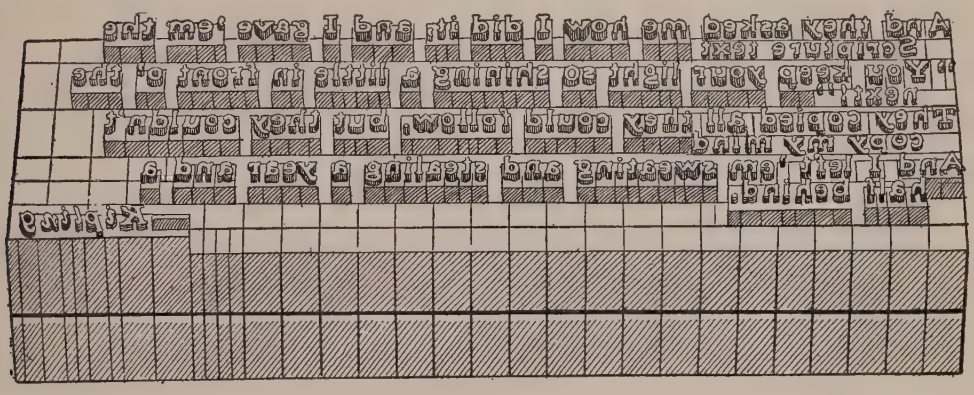
POINT SIZES	OLD NAMES
3½-point	Brilliant
4 or 4½-point	Diamond
5-point	Pearl
5½-point	Agate
6-point	Nonpareil
7-point	Minion
8-point	Brevier
9-point	Bourgeois
10 point	Long Primer
11-point	Small Pica
12-point	Pica
14-point	English
18-point	Great Primer

Types differ in width according to the letter, but the letter M, which is the nearest square, is used as the standard in measuring the amount of composition in any form. Formerly the sizes were described altogether by name, but now the point system above referred to is used in place of the name. The twelve-point, or pica type, is the unit, a point being equal to a seventy-second of an inch.

The following is the relative proportion of the different letters:

LETTER.	NUMBER.	LETTER.	NUMBER.
a	4,500	n	4,000
b	1,000	o	4,000
c	2,000	p	1,200
d	2,500	q	300
e	7,000	r	3,500
f	1,500	s	4,000
g	1,000	t	5,000
h	3,000	u	2,250
i	4,500	v	750
j	250	w	1,250
k	400	x	225
l	2,500	y	1,250
m	1,500	z	150

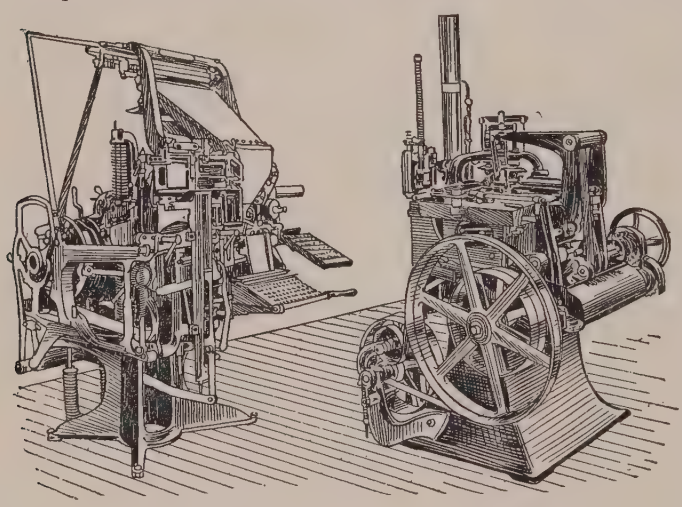
The em of eight-point is a square eight points each way. In an inch are nine ems, hence a square inch has 81 ems. To compute the number of ems, find the size of a page of any printed matter in square inches and multiply by 81; the product equals the total number of ems in eight-point or brevier type. Other sizes of types may be measured by the same rule. A font or fount of type is a full set for printing. The quantity of different types in a font corresponds to the frequence of their occurrence in printed matters. A complete font of type consists of 226 different characters and includes capitals, small capitals, lower-case letters, capital italics, lower-case italics, punctuation marks, figures, and signs. The proportion of letters varies according to the characters of various languages, some using relatively more or less vowel or consonant sounds. There is likewise a difference of writers of the same language, as, for instance, Dickens's works contain relatively more vowel sounds than are used by Macaulay.



TYPE CAST ON THE MONOTYPE AND READY TO BE PUT IN THE FORM FOR PRINTING.

Type is set exclusively by hand only in the smaller offices and for special purposes, such as headlines in newspapers and books, and adver-

tisements using the large bold-faced type. All the larger publishing houses issuing books and periodicals use typesetting machines, or machines in which individual type is dispensed with and the line becomes the movable unit. The first typesetting machine was patented in England in 1822. It was operated by manipulating a keyboard similar to that of a typewriter, the pressure of each key releasing a type at the upper part of the machine. The types were received in a holder below and formed a continuous line, which was then divided into the proper lengths by a second operator, and, after being used in printing, they were distributed by a mechanical device guided by the nicks on the sides. This form is still employed to a considerable extent, but the machines have been vastly improved. To this class belong the Thorne, Empire, and Simplex typesetters. The typesetting and casting machines employ matrices, which are stored at the top of the machine and fall into a holder as



THE LINOTYPE. THE MONOTYPE.

the operator presses the keys. When sufficient matrices to form a line have been received in the holder, molten metal is carried by the machine to cast a complete line. The slugs or lines are afterward set up in the form and used in printing, after which they are again melted, to be recast. The Mergenthaler, or linotype, is of this class, and is the invention of Ottmar Mergenthaler (q. v.), a German inventor. It is capable of doing the work of eight to ten men and is used very extensively in American and Canadian printing offices. Other machines of this class include the Lanston monotype, the McMillan typesetter, the German plectrotype, and the French calendoli. See **Linotype; Monotype; Printing.**

TYPEWRITER (tīp'rī-tẽr), a machine for producing printed characters as a substitute for writing, now employed very extensively in all countries of the world. A large variety of typewriters are in successful use, but all agree in having a keyboard and metal keys serving to impress the letters or symbols upon the paper, through the medium of an inked ribbon or inked types. The first patent issued to an inventor of a typewriter was granted in 1714 to Henry Mill, though his invention was soon superseded by more practical devices for writing. Pierre Foucalt, a blind Frenchman, received a patent for a typewriter in France in 1841, which was used to a considerable extent in various countries of Europe. In 1843, Charles Thurber, of Worcester, Mass., invented the first really practical machine, but it did not possess sufficient speed to bring it into general use. A. E. Beach, of New York City, received a patent for a machine in 1856 which did good work, but it was not possible to write with sufficient speed.

The modern typewriter dates from 1867, when C. L. Sholes, Carlos Glidden, and S. W. Soulé, three inventors of Milwaukee, Wis., constructed a machine that developed into the now famous Remington. Most of the credit in completing this machine belongs to Sholes, who took it to Ilion, N. Y., in 1873, where he interested the firm of E. Remington & Sons in its manufacture. This machine has been improved successively and is sold to a great extent in the markets of the world. The Remington is a bar machine, the bars being arranged in a circle, around a common center. It has a shift mechanism for printing capitals, and the necessary ink is supplied by means of a ribbon. In the early type of the Smith-Premier the bars had one type and were not operated by a capital shift. Machines of this class have a double keyboard, that is, a separate key for each character printed. However, the Yost had a compound bar motion and inked the type by coming in contact with a moist pad, instead of striking against a ribbon. The Hammond, Munson, Crandall, Blickensderfer, and several others have a type wheel instead of bars, and the manufacturers claim uniform impressions and perfect alignment. Another type of machines is on the Oliver style, having U-shaped type bars, and, like the Hammond and several others, keeps the work always in plain sight of the writer. Typewriting is taught in many public schools and other institutions of learning. A skilled operator is able to write at the rate of 90 to 125 words a minute. Machines now in general use include newer types of the Underwood, Remington, and L. C. Smith.

TYPHOID FEVER (tī'foid), an infectious disease marked by great prostration. It is now known to be due to a specific germ, the *typhoid bacillus,* which is taken into the system chiefly

by swallowing. Some have held that typhoid is essentially the same disease as typhus, though others hold that these diseases are characterized by marked differences. Typhus more specifically affects the cerebral organization and nerve centers, while typhoid is essentially an abdominal affection, characterized by serious disorder of the bowels. Typhus is a continued fever marked by a peculiar rash or spots of a dark mulberry color, the muscular and nerve affection being at first accompanied by delirium and later by stupor. It is most prevalent among those ill fed and dwelling in badly ventilated and neglected houses. Typhoid fever, on the other hand, is spread chiefly by infected milk, leakage of sewers from closets of typhoid fever patients into buildings, polluted soil or street dust, and an infected water supply. Formerly 14 per cent. of the cases proved fatal, but under more efficient treatment it has been possible to reduce the mortality to about 9 per cent.

TYPHOON (tī-fo͞on′). See **Storms.**

TYPHUS FEVER (tī′fŭs), a contagious disease, known locally as spotted fever and jail fever. It is attended with great prostration of the vital powers, and the patient often has a rash that resembles the appearance of measles. The disease is caused by destitution, overcrowding, and want of proper sanitation. Anciently it was a common scourge in the great seaports, but the precautions of modern times have counteracted its occurrence and greatly reduced its harmful effects. The specific cause is not definitely known, but it is thought to be a micro-organism. It is attended in the early stage by nervousness, headache, and rheumatic pains, followed later with nervous prostration, delirium, and the development of slightly elevated spots. The crisis occurs at the end of the second week. Since typhus is highly contagious, the patient should be promptly isolated and given careful medical attention.

TYR (tĭr), in Scandinavian mythology, a son of Odin and a brother of Balder. He was the god of war and fame, corresponding to the Mars of the Roman, and was prayed to by the heroes for victory. See **Tuesday.**

TYRANT (tī′rant), the name of a ruler in ancient Greece. Such an official was not necessarily despotic and cruel as the term implies in modern times. Tyrants usually were highly respected and powerful citizens, but who, by stratagem or by force of necessity, assumed the government of a city or a state. In many cases they were men of wisdom and their government was highly beneficial from social and commercial standpoints. These rulers appear in nearly all periods of Greek history, but they were most numerous in the 7th and 6th centuries B. C. Later the tendency of the times induced powerful families to assume authority and rule over the people in an unjust and oppressive manner. From this circumstance came the modern word tyrant, which designates a cruel and unjust executive, no matter whether he is a usurper or a legally constituted king or potentate.

TYRE (tīr), a celebrated city of ancient Phoenicia, on the Mediterranean Sea, about 90 miles north of Jerusalem. It consisted of two parts, one on the mainland and the other on an island near the shore. The region surrounding it was in a high state of cultivation, yielding grain, fruits, and vegetables, and toward the inland were fine forests of fir and cedar. King Hiram of Tyre supplied Solomon with a quantity of timber and gold for the construction of the temple at Jerusalem. At that time it had excellent fortifications, the harbor was among the most secure of that period, and in commercial importance it took high rank. Its greatest prosperity is supposed to have been attained in the period ranging between 980 and 800 B. C. A colony of Tyre under Dido founded Carthage in 813 B. C. With the use of the newer city considerable trade was detracted from Tyre, thus causing it to lose prestige with its sister city, Sidon, which was situated about 25 miles toward the north.

Tyre withstood a siege by Sargon, King of Syria, but was partially reduced to submission after being besieged by Nebuchadnezzar for thirteen years, though its independence and prestige were not destroyed. Alexander the Great, in 322 B. C., besieged and conquered the city. He annexed it as a Grecian colony, constructed a mole or causeway between the island and the mainland, traces of which still remain, and restored much of its former commercial importance. Cleopatra and Antony came into possession of Tyre in the Roman period, when it still ranked as an important commercial city. It was taken by the Saracens in the 7th century, and afterward by the Crusaders, who held it until 1192. Selim I. conquered it in 1516 and since then it has been a Turkish possession. It was long famous as the chief seat of the manufacture of Tyrian purple dye, obtained from the shellfish murex. The sea has covered many of its ancient ruins, though it still has remains of tombs and walls and a Christian cathedral dating from 324. The site is partly occupied by a town called Sur, which has a population of 6,140.

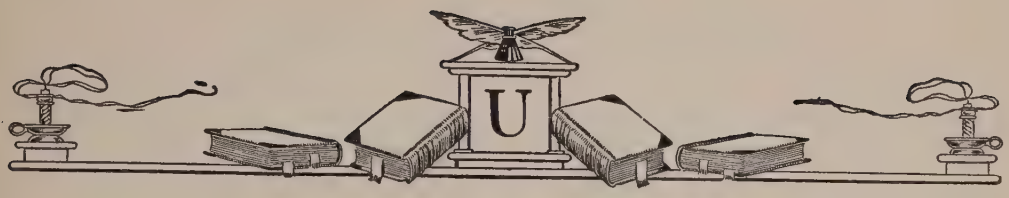
TYROL (tĭr′ŏl), a crownland in western Austria, lying east of Switzerland and north of Italy. It has an area of 11,325 square miles, and may be regarded an eastern continuation of Switzerland, the scenery being equal in grandeur to that of the Swiss highlands. The Alps enter it from Switzerland in three chains, thus dividing the region into three large valleys. The central mountain chain, called the Tyrol or Oetzthaler Alps, are the loftiest elevations of Austria and include a number of peaks covered perpetually with snow. The northern range is known as the Tyrolese or German Alps, and the southern, as the Trent Alps. About one-third of the region has valuable forests, one-third is mountainous, and the remainder is cultivated. It has

productions of corn, wheat, rye, barley, fruits, and vegetables. Cattle, horses, sheep, swine, and poultry are reared in abundance. The mines yield coal, gold, silver, copper, iron, salt, marble, and building stone. Wine, ironware, silk textiles, embroidery, furniture, lace, machinery, and implements are among the manufactures. The language spoken is German, but a number of Italians reside in the southern part. The Romans conquered Tyrol in the year 15 B. C. and annexed it to Rhaetia. After the decline of Rome it constituted a part of Germany. The French invaded it in 1809 and conquered the region in spite of heroic resistance by the Tyrolese under Andreas Hofer, but it was restored to Austria in 1814. The southern part was annexed to Italy in 1919. Population, 1920, (including Vorarlberg), 1,092,292.

TYRONE (tī-rōn'), a borough of Pennsylvania, in Blair County, 15 miles northeast of Altoona, on the Little Juniata River and the Pennsylvania Railroad. It is surrounded by productive coal fields. The chief buildings include several public schools and a number of fine churches. About three miles distant is the Birmingham Seminary. It has electric lighting, sewerage, and waterworks. The manufactures include shoes, ironware, leather, clothing, and machinery. The region was settled in 1811 and Tyrone was incorporated as a borough in 1857. Population, 1920, 9,084.

TZARSKOYE (tzär'skŏ-yę), or **Sofia,** a town of Russia, located 15 miles south of Saint Petersburg, noted as the summer residence of the czars. It was first made the country residence of Peter the Great. The palace was built in 1744, but since then many extensive improvements have been made. Near the palace is a castle of Gothic architecture, a smaller palace building dating from the time of Alexander I., and a triumphal arch to commemorate the expulsion of Napoleon from Russia after the burning of Moscow. The town has an arsenal and railroad facilities, and is beautifully improved by parks, gardens, and numerous public buildings. Population, 1919, 26,532.

TZSCHIRNER (chĭr'nĕr), **Heinrich Gottlieb,** eminent theologian, born in Mittneida in Saxony, Germany, Nov. 14, 1778; died Feb. 17, 1828. In 1801 he entered holy orders, after studying theology in Wittenberg. Subsequently he lectured in Leipsic and Meissen. He was one of the leading Protestant theologians of his time and was alike influential as a pulpit orator and lecturer. His writings include "The Reactionary System," "Readings in the Christian Faith," and "Critical Comparison of Protestantism and Catholicism."



U, the fifth vowel and the 21st letter of the English alphabet. The Phoenician alphabet did not have this letter and, to supply the deficiency, it was originated by the Greeks. Originally *V* was the capital form of the letter *u,* but the two were differentiated in the 15th century, although they were used interchangeably for some time afterward. The true sound of *u* is that of *oo* in *cool, tool, wood* and *woo.* This sound is still retained in most European languages. It corresponds to the French *ou* in *tour.* The letter has a *short* sound, as in *fun, tun,* and *cut,* and a *long* sound, as in *due, sue,* and *mute.*

UBANGI (ū-băn′gĭ), a river of Africa, in the central part of that continent, known near its mouth as the Mobangi. It has a course of about 1,500 miles and is a northern tributary of the Congo River, which it joins near Equatorville. The Ubangi forms the northwestern boundary of the Congo Free State, which it separates from French Congo. It was discovered by Schweinfurth in 1870 and was explored by several Europeans about ten years later. The valley of the Ubangi is fertile. A large part of the country through which it passes is densely populated by natives.

UCAYALI, or **Ucayale** (o͞o-kä-yä′lĕ), a river of Peru, the longest headstream of the Amazon, regarded by many as the true source of that river. It is formed by a number of branches in the western slopes of the Andes. The general course is toward the north, joining the Amazon near Nanta. The portion under its own name has a length of 1,000 miles and its main branch, the Apurimac, added to it makes its course equal to about 1,500 miles. The Ucayali River is the chief outlet of Peru toward the northeast, being navigable for small steamships a considerable distance. The valley is rich in fine forests and fertile soil.

UDALL (ū′dąl), **Nicholas,** author, born in Hampshire, England, in 1505; died in 1556. He studied at Corpus Christi College, Oxford, where he was elected a fellow. In 1534 he became master at Eton and twenty years later was made head master of Westminster School. His reputation is based chiefly upon "Ralph Roister Doister," a comedy written after the Roman style. It was first published in 1566, ten years after his death, and is the earliest comedy in the English now extant.

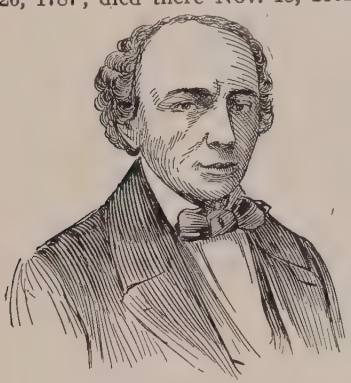
UFFIZI, a celebrated palace of Italy, in Florence. It was erected in 1560, under the direction of the Medici family, and contains one of the most valuable art collections in the world. The treasures within the palace include paintings and sculptures from the leading artists of Italy and other countries. Among the great masters represented are Michael Angelo, Titian, Raphael, Fra Bartholomeo, Correggio, Rembrandt, Holbein, and many others. The celebrated statues within the palace are "The Dancing Fawn," "The Wrestlers," "Dying Alexander," and "Venus d'Medici."

UGANDA (o͝o-gän′dȧ), a British protectorate in the interior of East Africa, having an area of about 220,000 square miles. It is situated northwest of Lake Victoria Nyanza and east of the Congo Free State. The region is drained by the streams forming the headwaters of the Nile. A railway line provides connection with Mombasa, a seaport on the Indian Ocean. The Equator crosses the southern part, thus giving it a tropical climate, but some of the regions are sufficiently elevated to make the temperature moderately favorable to Europeans. Some of the peaks tower 15,500 to 18,000 feet above sea level, and there are eighteen glaciers on Mount Kenia, the highest summit. The soil is fertile in the valleys and plains and it has an abundance of timber. Ivory, rubber, coffee, fruits, and cattle are the chief exports. The government is administered under a British commissioner at Mengo, the capital. A large majority of the inhabitants are Bantus and Bagandas, who engage chiefly in agriculture and stock raising. The so-called sleeping sickness appears periodically, which, in 1908, caused the death of 200,000 persons. Uganda proper has a population of about 450,500, but including certain other territories, such as Usoga and Koki, it is placed at 3,750,000.

UHDE (o͞o′dȩ), **Fritz von,** painter, born at Wolkenburg, Germany, May 22, 1848. When eighteen years of age he enrolled at the Dresden Art Academy, but soon gave up his studies to enter the military service of Saxony. In 1877 he took up the study of painting at Munich,

where he remained two years, when he removed to Paris to work under the direction of Mihály Munkácsy. In 1881 he completed the painting entitled "Family Concert" now in the museums of Cologne, which combines the coloring of old Netherland models with that of modern painters. His productions are very numerous and include a diversity of historical and genre paintings. Among his chief works are "Christ with the Disciples at Emmaus," "Wise Men from the East," "Sermon on the Mount," "Arrival of the Organ Grinders," "Woman, Why Weepest Thou," "The Last Supper," and "The Ascension." He died Feb. 25, 1911.

UHLAND (o͞o'länt), **Johann Ludwig,** eminent poet, born in Tübingen, Germany, April 26, 1787; died there Nov. 13, 1862. He studied at the university of his native city and, after graduating, entered upon a successful practice of law. In 1829 he became professor of the German language and literature at the Tübingen University, but resigned four years later to devote himself to literature and politics. He was made a member of the Frankfort parliament in 1848, where he attained a wide influence as a member of the liberal party. His first literary work was published in 1815, entitled "Selected Poems," which was in fact a collection of writings produced by him at different times. This work includes a large number of patriotic songs written to express German sentiment in regard to the war against Napoleon and many of them are still popular. About 75 editions of his "Selected Poems" have been published. His dramas include "Ernest of Swabia" and "Louis the Bavarian," and his essays, "Myths of the North" and "Walter." The writings of Uhland are full of spirit and truth, and their style suggests vigorous study and sweetness of sentiment. Longfellow's "The Black Knight" and "The Castle by the Sea" are translations from the poems of Uhland.



JOHANN LUDWIG UHLAND.

UHLANS (o͞o'länz), a term meaning landers, the light cavalry introduced to Western Europe by the Tartars, and now maintained as an adjunct to the armies of Germany, Austria, and Russia. The uhlans of Germany were distinguished particularly for their bravery and activity in the War of 1870-71. They rendered excellent service at Sedan and several other battles.

UINTAH MOUNTAINS (ū-ĭn'tà), an elevated range of the Rocky Mountain system, in the northeastern part of Utah. They trend in a general direction from east to west and join the Wasatch Mountains some distance west of Salt Lake City. The drainage is chiefly by the Green River and its tributaries. Gilbert Peak, the highest summit, has an elevation of 13,685 feet.

UJIJI (o͞o-jē'jē), a city of British East Africa, on the eastern shore of Lake Tanganyiki. It is surrounded by a fertile region and is the center of a vast interior trade. A trade route connects it with Dar-es-Salaam. Ujiji was formerly a great slave market, an institution suppressed by European authority, and it is now the chief town on the lake. Most of the inhabitants are Africans. Population, 1922, 25,281.

UKRANIA, or **Ukraine,** the name applied to the portion of southwestern Russia which commonly is known as Little Russia. It embraces the governments of Ekaterinoslav, Kherson, Kiev, Podolia, Poltava, Tchernigov and some adjoining districts. This region was made a part of Russia in the second partition of Poland, in 1667. The people are a distinct class of Slavs, known as Ruthenians, and are related more closely to the Poles than to the Moscovites. Kiev is the center of their political influence. Population, 1922, 22,500,000.

ULFILAS (ŭl'fĭ-làs), or **Ulphilas,** eminent Gothic scholar, born about 310; died in Constantinople in 381 A. D. It is thought that he was born of Gothic parents who resided north of the Danube, though some writers think that he descended from Christian parents in Cappadocia and that he was carried into captivity by the Goths. He studied the Gothic, Hebrew, and Greek languages and in 348 was consecrated bishop. The barbaric people of his race expelled him from their settlements, but he retired with a number of converts to Moesia, where he operated successfully for thirty years. He devised a Gothic alphabet after that of the Greeks, translated most of the Bible into the Gothic, encouraged his countrymen to engage in agricultural arts, and greatly extended interest in learning and Christianity. In 360 he attended a council in Constantinople, which had been convened by the Arian Christians. A number of the writings of Ulfilas are in the University of Prague and in the Swedish University of Upsala. The Bible as translated by him was in common use among the Gothic people.

ULLMANN (o͞ol'män), **Carl,** theologian, born in Epfenbach, Germany, March 15, 1796; died in Carlsruhe, Jan. 12, 1865. He studied under private tutors and at Halle and was professor at the universities at Halle and Heidelberg. In 1853 he was made bishop in Baden. Three years later he became president of the ecclesiastical council, but retired after serving successfully for four years. His religious views were in accord with those of Schleiermacher, who was his firm friend. Ullmann aided others

in establishing the quarterly review, *Studies and Critics,* in which he published many reviews and essays. His chief writings are "Reformers before the Reformation," "Apologetic View of the Sinless Character of Jesus," "The Worship of Genius," and "Gregor of Nazianz." His "History of Mythology" was written in opposition to Strauss's "Life of Christ." Many of his writings have been translated into Eurasian languages.

ULM (ŏŏlm), a city of Germany, in the government of Württemberg, 45 miles southeast of Stuttgart. It occupies an elevated site on the Danube, has extensive railroad facilities, and is one of the most strongly fortified cities of southern Germany. Two fine bridges cross the Danube and unite the city with New Ulm, a town in Bavaria. The chief building is the Münster, a fine Protestant cathedral, having a seating capacity for 10,000 people. It is 475 feet long and 165 feet wide. The tower is 530 feet high, being the highest in the world. Other buildings include the palace of justice, the city hall, the post office, the railroad depot, the gymnasium, an agricultural institute, and a number of commercial and industrial schools. Among the manufactures are leather, cotton and woolen fabrics, paper, linens, machinery, sailing vessels, ironware, tobacco products, and farming implements. Electric and gas lighting, stone and macadam pavements, waterworks, electric street railways, and several fine parks are among the improvements. The surrounding country is fertile, supporting fine vineyards, orchards, gardens, and farms. Ulm occupies the site of a Roman town. It joined the Reformation in 1531 and since then a large majority of its people have been Lutherans. In 1802 it became a part of Bavaria, three years later was the scene of a noted battle between Napoleon and the Austrians, and in 1810 was made a part of Württemberg. Population, 1920, 55,817.

ULTRAMARINE (ŭl-trȧ-mȧ-rēn′), a beautiful pigment of a blue color, valued for its durable quality. It is obtained from the mineral lazulite, or lapis lazuli, and contains lime, sulphuric acid, silicia, allumina, soda, sulphur, iron, and chlorine. Formerly it was obtained only from lazulite, which is found in Chile, Persia, and Siberia, but it is now produced on a commercial basis, hence is less expensive than formerly. Painters use it both for oil and water colors. The value of this pigment consists of being both attractive and permanent.

ULTRAMONTANISM (ŭl-trȧ-mŏn′tȧ-nĭz′m), the theory that the authority of the Pope should be increased rather than minimized. This view is held by a considerable number of the Roman Catholics, especially those who advocate the superiority of the Pope over the statutes of an ecumenical council. Those opposed to this view are known as *Gallicans* and their tendency is called Gallicanism. Ultramontanism considers the Pope superior to the general councils and independent of their decrees, and regards him the source of all jurisdiction in the church. This view was established as a doctrine by the Vatican Council of 1870, in connection with the doctrine of papal infallibility. The name Ultramontanes is applied to political parties in Austria, Germany, and France, these representing the view that greater consideration should be given to Roman Catholicism.

ULYSSES (ū-lĭs′sēz), in Greek, *Odysseus,* King of Ithaca, famous leader of the Greeks in the Trojan War. He was the husband of Penelope and the father of Telemachus. It is reputed that he lived happily with his family in Ithaca at the time Helen was carried away by the Trojans. As he was reputed of wisdom and great astuteness, he did not desire to leave his happy home for an expedition of uncertain duration, and accordingly feigned madness by plowing the seashore with a horse and an ox. The shrewd Palamedes exposed his deception by placing his infant son in the furrow, when Ulysses quickly turned aside the plowshare to save the child. He soon joined the Grecian fleet with twelve ships, where he became noted for his valor and wisdom in aiding the Greeks. After the death of Achilles, he and Ajax contended for the armor of the fallen hero, which Ulysses won. He not only invented the wooden horse taken into Troy, but was one of the Greeks who concealed themselves on the inside and took an important part in winning the city. After the final capture of Troy he sailed for his native land with his twelve ships and his return voyage, which covered a period of ten years, is the subject of the *Odyssey* of Homer. His first strange adventure occurred when his ships were driven to the land of the Lotophagi, where his sailors ate of the lotus fruit and thus lost all desire to see their native country and home again. Ulysses caused them to be tied and carried to the ships, after which they visited the island of the Cyclops, where they were imprisoned in the cave of Polyphemus. This giant ate six of his companions, but Ulysses finally made him drunk with wine brought from the ships and, putting out his one eye, escaped safely as the sheep were driven from the cave.

The next notable adventure of the company was on the island of Aeolus, where Ulysses received a bag filled with favorable winds as a gracious gift of the gods, but his sailors opened it at an inopportune time and the ships were again driven to the island. After losing all his ships but one, he sailed safely to Aeaea, where Circe, the sorceress, temporarily changed his companions into swine. He passed the island of the Sirens in safety by having himself tied to the mast, while the ears of his followers were filled with wax to escape being subdued by the enchanting music of the Sirens. He passed the dangers of Scylla and Charybdis in safety, but his companions killed some of the

cattle of Helois at Trinacria while he slept, and a great storm arose and drowned all on board except himself. He was carried in safety to the island of Ogygia, where he lived with the nymph Calypso, who promised immortality if he would wed her. However, he effected his escape on a raft and finally returned to Ithaca, having been away from home a period of twenty years. He reached the abode of Penelope in disguise, finding that suitors for her hand had wasted his substance and occupied his palace,

MAP TO SHOW THE WANDERINGS OF ULYSSES.

but his son, Telemachus, and Minerva aided him in putting them to death. He died sixteen years after returning to his home. See **Homer.**

UMBELLIFERAE (ŭm-bĕl-lĭf'ê-rē), an extensive family of herbs and shrubs, so named from the shape of the umbels or clusters of flowers and fruit. They are found in both hemispheres, but are most numerous in the cool regions. Some writers apply the name *parsley* to the entire family. Most species have hollow stems and perfect umbels of flowers, but these are not uniform in all. Oil and resinous substances are derived from the leaves of many plants of this family and in many cases the odor is pleasing, while in others it is disagreeable. The roots contain starch and sugar. Many are poisonous and some yield medical properties of value, such as ammoniac and assafoetida. The species generally known and cultivated include the caraway, celery, parsley, parsnip, carrot, coriander, anise, dill, and fennel.

UMBER (ŭm'bĕr), a mineral pigment of an olive-brown color when in a raw state, but which, when burned, has a deeper red. It is composed of ocherous earth and manganese, and is obtained from natural deposits or by artificial preparation. The best grade is known as *Turkey umber* and is obtained in Cyprus. Umber is useful in oil and water-color painting, being durable and forming a good body. It is often mixed with other pigments, especially white lead.

UMBRELLA BIRD (ŭm-brĕl'lâ), the name of a singular bird found in South America, so called from its parasollike crest. This bird is allied to the crows. It has a stout bill, moderately large wings, a naked neck, and a chattering voice. It is not only peculiar for its crest, but likewise for its beardlike growth of feathers that project downward from the neck. Two species have been described.

UMBRIA (ŭm'brĭ-â), a division of ancient Italy, lying between the Adriatic Sea and Etruria. It was situated north of the Sabine country. The region included the Upper Tiber and the Rubicon and in the early period was restricted to the ridges of the Apennines, but at a later time it developed into a powerful state. Its principal cities were Sena Gallica (now Sinigaglia), Pisaurum (Pesaro), Fanum Fortunae (Fano), and Spoletium (Spoleto). The Umbrians and Etruscans were subjected by the Romans in 308 B. C., but they joined the Samnites in a formidable struggle against the Romans at Sentinum, where they met their final defeat in 295 B. C. The name Umbria is now applied to a province of Central Italy, lying southeast of Tuscany and north of Latium. Spoleto is the capital and Perugia is the chief city.

UNALASKA (ōō-nä-läs'kà), the second largest island of the Aleutian chain, situated southwest of the Alaska Peninsula. It is 75 miles long and from 10 to 25 miles wide. The area is about 1,100 square miles. Deep-cut fiords indent the shore and much of the interior is a barren and treeless tableland. Makushin, an active volcano, has an elevation of 5,961 feet. The inhabitants consist chiefly of Aleuts and are mostly at Unalaska, or Iliuliuk, on the northern shore. Fishing, sealing, and trading are the principal industries. Population, 1908, 443; in 1922, 461.

UNCAS (ŭn'kŭs), an American Indian chief, born in the Pequot settlement of Connecticut about 1588; died near Norwich, Conn., in 1682. A disagreement in the Pequot tribe caused him to be expelled and he proceeded east from Lyme, Conn., where he reorganized the Mohegan tribe. In 1637 he formed an alliance with the colonists against the Pequots, and, being successful, he secured a portion of the conquered territory. He defeated Miantonomoh, chief of the Narragansetts, in 1643, and brought him a prisoner to the colonial authorities. The latter was killed by a brother of Uncas, after having been tried on a charge of causing disturbances among the Indians. The close friendship of Uncas with the colonists caused the Narra-

gansetts and Mohawks to make an attack upon the Mohegans. He would have been captured by the hostile Indians except for the timely arrival of Thomas Effingwell, of the British army, and as a mark of gratitude he gave the latter the tract of land now forming the site of Norwich. He was a constant friend of the English, always remaining faithful to his treaties. A monument was erected to his memory at Norwich in 1825.

UNCIAL LETTERS (ŭn'shạl), a kind of letters used in preparing Greek and Latin manuscripts during the early part of the Middle Ages. These letters are more nearly round in form than the capitals and may be said to combine some of the features of the small characters with the capital letters. The custom of using uncial letters is thought to have originated from the greater difficulty of making the angular capitals, hence ease and speed seem to have contributed to the rounder script. These letters were the prevailing style from the 6th to the 8th century.

UNCTION (ŭnk'shŭn), the custom of anointing a part or the entire body with oil, as with the oil of olives. Anciently the practice was resorted to as a luxury or to promote health, but it gradually developed into a religious one. In the Roman Catholic Church it is known as the *Extreme Unction* and the council of Trent declared it to be a sacrament. The oil used is blessed by the bishop, which he does with great solemnity once each year on Maundy Thursday, and the oil so blessed is used during the year. In the administration of the sacrament by the priest, he dips his finger in the oil and anoints the sick person by applying it upon the eyes, ears, nose, mouth, hands, and feet. At each locality he makes the form of the cross and repeats, "Through this holy unction, and His most tender mercy, may the Lord pardon thee whatever sins thou hast committed by thy sight. Amen."

UNDERGROUND RAILROAD, the name used in the United States before the Civil War to designate the system adopted by some people in the north to aid fugitive slaves in escaping from their masters. Many thousands of fugitives were thus directed to the northern boundary, where they passed into Canada and beyond the reach of the Fugitive Slave Law. The plan included to designate certain routes and list houses at convenient intervals, known as *stations,* and the whites conducted or conveyed the fleeing Negroes from one point to the next. In all cases they were given food and shelter, in return for which they worked a few days, or were sheltered, transferred, and even clothed from humanitary motives. Levi Coffin was foremost in this movement and devoted nearly thirty years of his life to the enterprise. Most of the fugitives were conveyed from Virginia and Kentucky through Ohio and Pennsylvania. Thomas Garret claimed to have aided 2,700 slaves to make their escape, but was required to pay fines aggregating $8,000. Charles Farrer is said to have personally aided 400 in escaping. According to some accounts, not less than 25,000 slaves escaped by these means during the 25 years preceding the war.

UNDERGROUND RAILWAY. See **Subway; Tunnel.**

UNDERSHOT WHEEL, a kind of wheel used to develop power by utilizing the force of running water. It has a number of flat boards, called *floatboards,* placed on its circumference and is moved mainly by the impact or blow produced by the moving water acting upon the floatboards at its lowest part. This kind of water wheel is used where a large volume of water moves slowly, as in a tidal stream. In such a stream the floatboards are usually placed at right angle to the rim of the wheel and motion is obtained as the tides flow in and out. However, when the direction of the stream is constant, the floatboards are inclined at an angle to the current, in which case the water acts partly by its weight as well as by impact.

UNDERWOOD, Francis Henry, author, born in Enfield, Mass., Jan. 12, 1825; died Aug. 7, 1894. The *Atlantic Monthly* was founded under his plan, James Russell Lowell being its editor and Underwood officiating as chief assistant. President Cleveland made him consul at Glasgow, Scotland, in 1885, and in 1893 he became consul at Edinburgh. His literary works are numerous. Among his novels are "Man Proposes," "Cloud Pictures," and "Lord of Himself." His best known writings are those treating of literature, which were published in his "Handbooks of English-American Literature." The most popular of his works are "Builders of American Literature," "Biography of Lowell," "Handbook of English History," "Life of Longfellow," and "Biography of Whittier."

UNDERWOOD, Oscar W., public man, born in Louisville, Ky., May 6, 1862. He studied in Louisville and at the University of Virginia and practiced law at Birmingham, Ala. In 1894 he was elected to Congress as a Democrat and was reëlected from time to time. He became the Democratic leader of the House in 1911 and was prominently mentioned as a candidate for President in 1912.

UNGAVA (ŭn-gā'vȧ), a district of the Dominion of Canada, including the peninsula of Labrador, except the Atlantic coast region, which comprises the territory of Labrador and belongs to Newfoundland. It is bounded on the north by Hudson Strait and Ungava Bay, east by the territory of Labrador, south by Quebec, and west by James Bay and Hudson Bay. The area is about 456,000 square miles. Much of the interior is a tableland with an elevation of 2,000 feet above the sea, but the northwestern part is a plain with an elevation of not more than 500 feet. The shores on Hudson Bay and Ungava Bay are low and quite uniform. Inland the

country presents a varied aspect of marshy depressions, shallow lakes, and wide and sluggish streams. Most of the drainage is into Ungava Bay by the Leaf, Koksoak, and Whale rivers. The southwestern part is drained into James Bay and a few streams flowing into the Atlantic have their headwaters in the southeastern part.

The climate of Ungava is rigorous, but the dryness of the air contributes to make the winters favorable to northern people. Nearly the entire northern half is treeless, though large areas are covered with shrubs and small plants, such as currants, cranberries, huckleberries, and gooseberries. Large forests of birch and spruce are found in the valleys of the southern part. Tundras of considerable size extend inland from the northern coast, and these are characterized by the presence of lichens and Arctic flowering plants. Some classes of vegetables, especially potatoes, mature in the southern part, but the ground is frozen from September until June. Hunting and fishing are the principal occupations. The game consists mainly of the otter, beaver, fox, bear, reindeer, and water fowl. Extensive explorations were not made of the interior until 1894. Ungava was made a territory under the direct administration of the Dominion in 1897, but it was annexed to Quebec in 1908. The inhabitants consist mainly of Eskimos and half-breeds. Population, 1921, (estimated) 6,050.

UNGER (ŏŏng′ĕr), **Joseph,** jurist and statesman, born in Vienna, Austria, June 2, 1828. He studied at the University of Vienna, where he was made professor of jurisprudence in 1857. At the Austrian capital he was a leading factor in the discussion of political questions, was a liberal in politics, and joined Fischhof in publishing a work entitled "Solving the Hungarian Question." In 1867 he was made a member of the *Landtag* and subsequently served in the *Reichsrat* and the cabinet. From 1871 until 1879 he was a minister without a portfolio and in 1881 was chosen president of the supreme court. His chief work as jurist consisted of systematizing the law of Austria. Among his principal publications are "The System of the Private Law of Austria," "The Law of Austria Relating to Inheritance," "Revision of the Laws of the Kingdom of Saxony," and "Decisions of the Higher Court of Vienna." He died in 1913.

UNGULATA (ŭn̲-gû-lā′tȧ), an order of mammals which includes all those that have hoofs. Formerly the elephants were classified as Edentata, but they are now included with the Ungulates, and the list embraces many relative forms that are now extinct. The ass, zebra, horse, and a number of others have solid hoofs, while most of the animals of this class have toes that are inclosed in a horny hoof, as the sheep, goat, deer, elk, and cattle. The ungulates are the only animals that possess horns. The larger part are included with the ruminants, which have peculiarly formed stomachs and chew their cud. The ungulates are the most important to mankind, since they include the animals that furnish a large part of the food and clothing and embrace many that aid in doing a large share of the work. As animals of draft and burden, the horse, camel, elephant, ox, ass, and reindeer are the most important. Cattle, camels, and goats furnish milk. Wool is obtained from the sheep, but material for wearing apparel is likewise derived from the goat and the llama. All the ungulates furnish skins or hides of value in the industries.

UNICORN (ū′nĭ-kôrn), an animal having a single horn issuing from the middle of the forehead. It is mentioned by a number of Greek and Roman writers, but is thought to be fabulous. The unicorn is spoken of by Aristotle and Ctesias, both of whom describe it as native to India. It is said to have been about the size of a horse, with a white body, a red head, blue eyes, and a large horn on the fore-

TWO NEPALESE UNICORNS.

head. Such an animal is not known to naturalists and it is thought that the mythical tales of unicorns arose from careless observers viewing an antelope from the side, when the larger species of that animal appear to have a single horn. Others connect the story with the rhinoceros. The unicorn is pictured on the British coat of arms. The narwhal is spoken of by some writers as the sea unicorn.

A class of sheep which are native to Nepal, in Asia, have the extraordinary peculiarity that the number of horns differs in different individuals. The number ranges from a single horn to two pairs. Specimens with two, three, and four horns are as common among these sheep as those with a single horn. The accompanying illustration of two unicorns was obtained from animals of this class which are in the zoölogical gardens of London, England. In a

native state these animals live in the mountains and are very shy.

UNIFORM (ū'nĭ-fôrm), a particular fashion or style of dress worn by persons who belong to the same order or render the same service, as in the case of the police, the military, or a civic society. The custom of wearing some insignia or badge to designate position or rank is very ancient, and instances of it are found in the feathers and other objects worn by leaders among primitive peoples. However, authentic records of costumes do not extend back farther than the Crusades. The need for a particular kind of dress to be worn by divisions of an army seems to have originated in the time when different states or nations contributed to make up one powerful army, when a distinct pattern of dress was necessary to distinguish one subdivision, or the quota of men furnished by a particular state, from the others in the general military body.

The military uniforms of nearly all countries of Europe consist, at least in part, of styles that were worn as livery by the royal servants at some time in the past, and the colors of the royal coats of arms contribute largely in making up the respective apparels. In modern times the tendency has been to dispense with the gaudy and more attractive styles of dress, especially while in action, since the use of modern firearms makes it very desirable that the troops be uniformed as inconspicuously as possible. Khaki dye was introduced as early as 1880 for coloring uniforms, but originally it was not a fast color. In 1884 a fast dye was obtained and now both cotton and woolen materials are colored with this product, giving the uniforms a plain drab or dust-color appearance. While the advantage is that a body of men in action is thus less conspicuous, there is the disadvantage of having both contestants appear somewhat alike, which gave rise to frequent disadvantages even in the Anglo-Boer war. The Khaki color is now used to a considerable extent in painting the vehicles and large arms as well as the uniforms, the helmets, and the haversacks. This gives the soldier a dull shade and renders him practically invisible while partly obscured by the smoke while in action. There is likewise a tendency to dispense with the prominent marks that distinguish officers in the field, making them less liable to be singled out as a target for riflemen.

Uniforms used in the modern navies are quite similar, both in color and in style or pattern. In general the colors are blue or white, and the means of distinction are found in epaulettes, insignia, and gold lace. Each service has its special regulation as to the details provided for the purpose of distinguishing it from the others. The distinctive marks of rank are usually on the sleeves and shoulders, being in the form of straps or stripes. The styles differ according to the season and climatic influences. In general the uniforms in the navies of Great Britain and the United States are quite similar. Officers have eight different suits, each intended to be worn on a specific occasion. These include what is known as the full dress, ball dress, frock coat, frock coat with epaulettes, undress, mess dress, mess undress, and white undress. In the navy of the United States the officer wears a double-breasted coat with brass buttons instead of the undress uniform common in the British navy.

UNION, a town of New Jersey, in Hudson County, one mile north of Hoboken. It is situated on many hard surfaced highways, is served by motor buses and electric traction lines, and carries a large industrial trade. Among the features are the public library, the high school, the public park, and many fine churches. The manufactures include silk goods, candy, bread, clothing, and machinery. Population, 1905, 17,005; in 1920, 20,651.

UNION, a city of South Carolina, county seat of Union County, 65 miles northwest of Columbia, on the Southern Railway. It is surrounded by a fertile farming country, which produces large quantities of cotton and fruits. The manufactures consist of hosiery, cottonseed oil, ice, cotton goods, and machinery. Among the chief buildings are the county courthouse, the public library, the city hall, and a number of fine schools and churches. Electric lighting and waterworks are among the public utilities. It has a growing trade in farm produce and merchandise. Population, 1920, 6,141.

UNION OF SOUTH AFRICA, a possession of Great Britain, formed in 1910 by uniting Cape Colony, Natal, Transvaal, and the Orange Free State. The area is 473,100 square miles. In 1922 the population was 5,998,460, of which 1,280,480 were Europeans. See **Cape Colony, Natal, etc.**

UNION THEOLOGICAL SEMINARY, an institution of New York City, incorporated in 1836. It is interdenominational and exclusively theological. The property value is $3,569,378, the endowments aggregate $7,485,330, and the attendance is 458 students.

UNIONTOWN, a city in Pennsylvania, county seat of Fayette County, 70 miles southeast of Pittsburg. It is on the Pennsylvania and the Baltimore and Ohio railroads and is surrounded by agricultural territory, which produces cereals, grasses, and fruits. In the vicinity are deposits of gas and coal, and large quantities of both minerals are transported from the region annually. The features include the county courthouse, the public parks, the high school, and many churches and business houses. Among the manufactures are flour, tobacco products, clothing, iron and steel wares, coke, bread, and machinery. The place was settled in 1767 and incorporated in 1796. Population, 1900, 7,344; in 1920, 15,609.

UNIT, in arithmetic, the name applied to a single thing, as *one* or *unity,* represented by

the figure 1. In a wider sense, a number is a unit, or a collection of units classed under the same name, and answers the question, How many? In this sense the unit of a number is one of the things it expresses; thus, in five cents, one cent is the unit. Sometimes units are only relative in their character; thus, one foot is a unit in regard to feet, but it is only a part of a unit in regard to yards.

Three units are commonly used in electrical engineering. These are the unit of current, called the *ampere;* the unit of potential, called the *volt;* and the unit of resistance, called the *ohm.* For some purposes these quantities are subdivided; thus, in telegraphy the practical unit is the *milli-ampere,* that is, one-thousandth of an ampere. In some cases it is convenient to use multiples, as in the expression of insulation resistances in terms of *meg-ohms,* that is, a million ohms. The following multiples are used commonly:

1 megohm=1 million ohms,
1 microhm=1 millionth of an ohm,
1 kilowatt=1,000 watts,
1 microampere=1 millionth of an ampere.

The following are units for the various purposes stated:

One cubic foot of distilled water at 62° Fahr. is the unit of specific gravity for solids and liquids and one cubic foot of atmospheric air at 62° Fahr., for air and gases.

The quantity of heat necessary to raise the temperature of one pound of pure water from 39° to 40° Fahr. is the unit of heat, or the *thermal unit,* and in the metric system it consists of the amount of heat necessary to raise the temperature of a gram of pure water from 3.94 cent. to 4.94 cent.

In the metric system, the *centimeter* is the unit of length; the *gram,* the unit of mass; and the *second,* the unit of time. Hence, the *square centimeter* is the unit of area; the *cubic centimeter,* the unit of volume; and a *velocity of one centimeter per second,* the unit of velocity. The momentum of a *gram* moving with a unit velocity is the *unit of momentum.*

UNITARIANISM (ū-nĭ-tā'rĭ-ạn-ĭz'm), the doctrine of those professing Christians who, conceiving the Godhead as unipersonal, regard the Father as the only true God. The term *Unitarian* was used as early as Oct. 25, 1600, in a decree of the Transylvania diet, and was adopted by the Transylvanian Unitarians as the designation for their church in 1638. This branch is now known as the Hungarian Unitarian Church and has 60,000 members in Europe. Allied sects are well represented in many countries of Europe, especially in Great Britain and Poland. Unitarianism in America sprang from the Congregational body in the early history of New England, but it may be said to date as a distinct organization from the early part of the 19th century, when the preaching of William E. Channing and others brought its doctrines into prominent notice. The general body of American Unitarians accepts the Bible and the divinity of Christ, though the latter is not identified with the Deity. It has 575 ministers, 475 churches, and 78,500 communicants in the United States. The chief periodicals include *The Pacific Unitarian,* San Francisco; *The Christian Register,* Boston; *The Church Exchange,* Portland, Me.; *The Unitarian,* Boston; and *The New Unity,* Chicago. The church property has an estimated value of $10,285,000. In 1918, Canada had 4,000 Unitarians.

UNITED BRETHREN IN CHRIST, a Protestant religious denomination, founded in Pennsylvania in 1760 by Philip William Otterbein (1726-1813), a missionary of the German Reformed Church. The members of this denomination are now mostly English-speaking people. Like the Methodists, they have classes and class leaders, local and itinerant preachers, circuits, and conferences. The ministers are designated as elders. At present there are two regularly organized branches, called the Old and New Constitutions. The former has 975 churches, 725 ministers, and 45,500 members; while the latter has 4,250 churches, 2,525 ministers, and 260,000 members. The belief of those holding under the old constitution is Arminian, and those holding under the new constitution have a form of doctrine allied to that of the Congregational, Presbyterian, and Methodist churches. Missionary work is carried on in many foreign countries, especially in Africa, where the church has 450 preaching places and 7,500 members. The theological institutions include Otterbein University, Westerville, Ohio; Western College, Toledo, Iowa; and Lane University, Lecompton, Kan. The chief publishing house is at Dayton, Ohio, where they also maintain Bonebrake Theological Seminary. In Canada the United Brethren are represented by 1,650 members.

UNITED KINGDOM. See **Great Britain.**

UNITED STATES, the political division which occupies the central part of North America, the most powerful republic in the world, called officially the *United States of America.* It is bounded on the north by the Dominion of Canada, east by the Atlantic, south by the Gulf of Mexico and the Republic of Mexico, and west by the Pacific. The greatest extent from east to west is 3,100 miles and from north to south, 1,780 miles. It has an area of 3,025,600 square miles, exclusive of Alaska, which has an area of 577,390 square miles. The total area of the United States and Alaska is given by the United States Coast and Geodetic Survey to be 3,602,990 square miles, and, including the island possessions, 3,743,313 square miles, an expanse of territory larger than all of Europe. Alaska, which occupies the northwestern part of North America and includes the Aleutian Islands, is described in a special article. For information on the political divisions

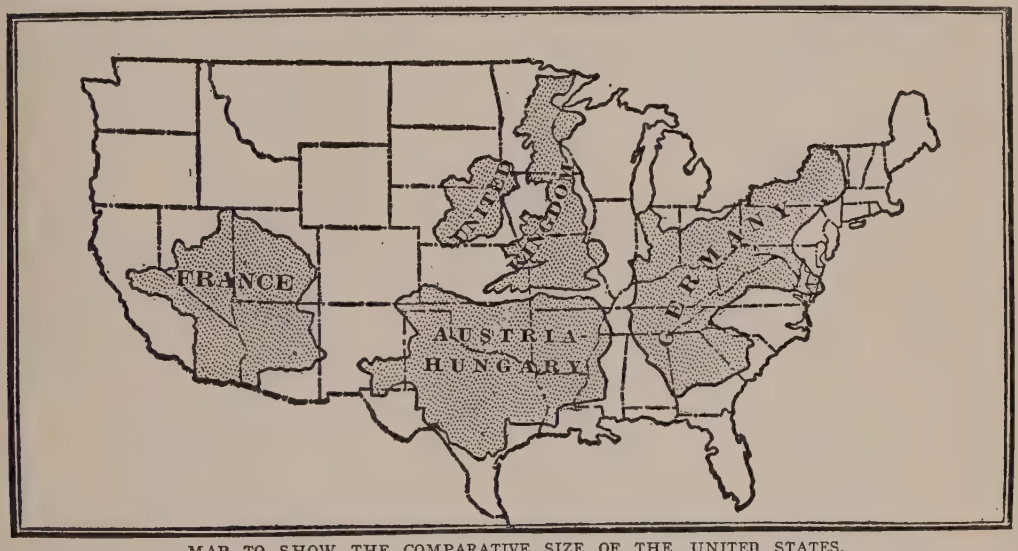
and the colonial possessions of the United States, the reader is referred to the articles in which they are specially treated.

The following table contains a list of the principal possessions, together with the area:

NAME.	AREA.
Alaska	590,884
Cagayán de Joló (Sulu)	1,029
Guam	190
Hawaii	6,450
Panama Canal Zone	474
Philippines	115,026
Porto Rico	3,606
Tutuila (Samoa)	54
United States	3,025,600
Total	3,743,313

BOUNDARIES. A large part of the northern boundary is formed by the 49th parallel, which extends from the Strait of Georgia, an inlet from the Pacific, to the Lake of the Woods, on the northern border of Minnesota. This line coast line, which is 2,350 miles long exclusive of indentations, is characterized by a number of large bays and inlets, which include Penobscot, Cape Cod, Chesapeake, New York, Massachusetts, Delaware, and Narrangansett bays and Long Island, Pamplico, and Albemarle sounds.

The southern boundary is formed in part by the Rio Grande, from the Gulf of Mexico to about the middle of the southern border of New Mexico, whence the boundary follows an arbitrary line to the Colorado River. From the point of intersection of the arbitrary line and the Colorado, the border follows that stream northeast to the mouth of the Gila River, whence it runs almost due west to the Pacific. The western coast is indented by San Diego, San Francisco, and Willapa bays, Grays Harbor, and Admiralty Inlet, an extension from the



MAP TO SHOW THE COMPARATIVE SIZE OF THE UNITED STATES.

is the most northern part of the United States, except a small peninsula in the western part of the Lake of the Woods, which extends about 25 miles farther north. From the Lake of the Woods the northern boundary extends eastward along the channel of the Rainy and the Pigeon rivers and through lakes Superior, Huron, Erie and Ontario, dividing these lakes about equally between the United States and Canada, except the larger part of Lake Superior belongs to the United States. East of Lake Ontario the boundary extends a short distance along the main channel of the Saint Lawrence River, to the 45th parallel, which it follows along the northern border of New York and Vermont, thence it passes northeast along the border of New Hampshire and Maine. From the northerly point of Maine it extends southeast, following partly the Saint John River, then it extends along an arbitrary line to the Saint Croix River, which it follows to the Atlantic. The Atlantic Strait of Juan de Fuca. In the northwest the border is formed by the Strait of Juan de Fuca, the Canal de Haro, and the Gulf of Georgia, which separates the country from Vancouver Island. The total coast line, including the inlets, but exclusive of the Great Lakes, is 12,608 miles. This embraces 2,280 miles on the Pacific, 3,468 on the Gulf, and 6,861 on the Atlantic. A shore line of 3,618 miles on the Great Lakes, in addition to the above, makes the entire coast 16,226 miles.

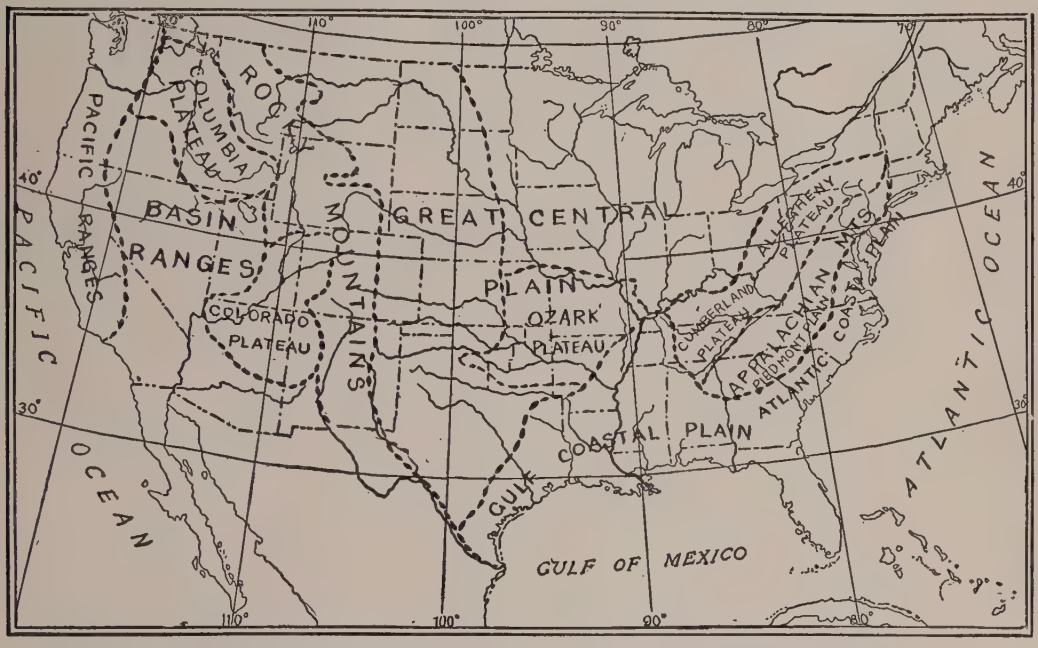
ISLANDS AND PROJECTIONS. The islands off the Atlantic coast include Long Island, Nantucket, Staten, Martha's Vineyard, Manhattan, Roanoke, and Florida Keys. Those in the Gulf of Mexico comprise the islands of Santa Rosa, Galveston, Saint George's, Tortugas, Padre, and the Chandeleur group. The San Juan, Santa Catalina, and Santa Cruz groups are the chief islands off the Pacific coast.

Three large peninsulas project from the

PHYSICAL MAP OF THE UNITED STATES.

mainland, including Florida, between the Atlantic and the Gulf of Mexico; Lower Michigan, between lakes Huron and Michigan; and upper Michigan, between lakes Superior and Michigan. Among the chief projections on the Atlantic coast are Cape Cod and Cape Hatteras; on the Gulf Coast, Cape Saint Blas and the Delta of the Mississippi; and on the Pacific coast, capes Mendocino and Flattery.

General Description. The United States, except its distant insular possessions, is wholly within the North Temperate Zone, the belt that comprises the seat of the leading nations of the world. It has much diversity of surface, climate, soil, and products. Five expansive natural divisions, differing in slope and elevation, make up the vast region extending from the Atlantic on the east to the Pacific on the west. These include the Atlantic slope, the Appalachian highlands, the Mississippi valley, the western highlands, and the Pacific slope.



MAP TO SHOW THE PHYSICAL DIVISIONS OF THE UNITED STATES.

The *Atlantic slope* is situated between the Atlantic and the Appalachian Mountains. It is but a few miles wide in the north, but gradually widens toward the south, forming an expanse of about 300 miles at the point where it joins the plains of the Gulf of Mexico. A narrow belt lying along the sea is known as the Atlantic coast plain, which gradually rises toward the west, where it finally merges into the Piedmont plain (q. v.). The latter comprises the foothills of the Appalachians and consist chiefly of a plain from a few hundred to a thousand feet above the sea.

The drainage of the Atlantic coast plain is toward the southeast into the Atlantic. Most of the rivers are small, but they flow with considerable rapidity, thus supplying an abundance of water power to many cities of commercial and manufacturing importance. The chief rivers of this section include the Penobscot, Kennebec, Hudson, Connecticut, Delaware, Potomac, Susquehanna, Roanoke, James, Neuse, Cape Fear, and Savannah.

The *Appalachian highlands* consist of several parallel ridges and chains, having altogether a breadth of about one hundred miles and including many long valleys. Some of the valleys are stony and unproductive and others possess remarkable fertility. The mountains are comparatively low, only a few of the peaks exceeding 6,000 feet in height. The highest points are in North Carolina and New Hampshire, being called the Blue Ridge Mountains in the former State and the White Mountains in the latter. Mount Mitchell is the highest peak of the Blue Ridge and Mount Washington of the White Mountains. Both rainfall and climatic conditions are quite favorable in the Atlantic coast plain and the Appalachian highlands, hence a considerable per cent. of the regions is covered with grasses or is susceptible to successful cultivation. These two divisions are the seat of the many noted manufacturing cities and are penetrated by numerous canals and railroads.

The *Mississippi valley* comprises the great central plain lying between the Appalachian highlands and the Rocky Mountains. It contains more than two-fifths of the territory and

more than half of the population of the United States. This region is the most fertile and healthful farming and stock raising section of North America and of the world. It extends northward to the Great Lakes, where a large scope of country is known as the *Lake Region*, including all of Michigan and portions of Ohio, Indiana, Illinois, Wisconsin, and Minnesota. The drainage is by the Mississippi and its vast network of tributaries, including the Wisconsin, Illinois, Ohio, and Yazoo from the east, and the Minnesota, Des Moines, Missouri, White, Arkansas, Washita, and Red from the west. The surface is chiefly an undulating plain, traversed by belts of timber along the streams in the north and covered with considerable forests in the south. It has an average elevation of about 1,000 feet above sea level, the surface rising gradually from the Gulf of Mexico, where the elevation is only a few feet, while in the central part it is about 1,000 feet and in the northern part it is about 1,900 feet. The Ozark Mountains, a low range of highlands, traverse parts of Missouri, Oklahoma, and Arkansas, and another group of mountains, the Black Hills, is situated on the boundary between Wyoming and South Dakota. There is a general rise from the 99th meridian westward, and the region between it and the Rocky Mountains is a more or less elevated section. This scope of country extends from the Gulf of Mexico to the Canadian line, ranging in width from 200 to 500 miles, and is called the Great Plains. Much of the soil is naturally fertile, with sandy tracts along the western parts, but a lack of rainfall renders irrigation profitable for the production of cereals in portions of these plains, especially in eastern Colorado and Wyoming and western Nebraska, Kansas, and Oklahoma.

The *western highlands* include the region occupied by the Rocky Mountains, the Coast Range, the Cascade Range, and the Sierra Nevada Mountains. This section is from 500 to 1,000 miles wide, comprising many elevated ridges and extensive valleys, and nearly all of it is more or less arid. The Rocky Mountains constitute the eastern chain of the highlands, forming the watershed between the Mississippi system and the rivers farther west. Between them and the Cascade Range and Sierra Nevada Mountains is the great plateau that includes the Wasatch Mountains and Great Salt Lake. Some of the peaks attain to heights of 12,500 to 15,750 feet, their summits being covered perpetually with snow, but their slopes are covered more or less with hardy forest trees. Many of the great rivers of America have their source in the Rocky Mountains, among them the Missouri, Colorado, Platte, Arkansas, Red, Rio Grande, Pecos, Columbia, and Yellowstone. In the great basin are the Bear and Jordan rivers, flowing into Great Salt Lake, and the Humboldt, flowing into Humboldt Lake. Between the Sierra Nevada Mountains and the Coast Range is the fertile valley of central California, through which flow the Sacramento and San Joaquin rivers. It is characterized by many fine lakes, beautiful waterfalls, and scenic cañons.

The *Pacific slope* includes the region west of the Cascade Range and Sierra Nevada Mountains. It is diversified by numerous valleys and mountain groups. Besides the Sacramento and San Joaquin rivers, it includes the Willamette, Umpqua, Roque, and Klamath rivers, and the lower course of the Columbia. The Pacific coast has precipitous and rocky shores and stretches from Lower California to the Strait of Juan de Fuca, a distance of 2,280 miles. The principal inlets include the bays of San Diego, San Francisco, and Monterey. Puget Sound, an inlet from the Pacific through the Strait of Juan de Fuca and Admiralty Inlet, is in the northwestern part of Washington. Dead Valley, a depression in Southern California, is about 300 feet below the level of the sea.

DRAINAGE. The rivers furnish about 24,500 miles of navigation facilities. Many of the principal streams have already been mentioned under the five natural divisions into which the surface of the United States may be divided. However, the drainage may be classified into five distinct divisions, depending upon the direction in which their waters reach the sea. These include the rivers that belong to the systems of the Gulf, the Atlantic, the Pacific, the Great Lakes, and the Great Basin. They are important in the order named, both from the volume of water discharged and their relative importance commercially. The system of the Gulf, besides the Mississippi and its tributaries, includes the Appalachicola, the Alabama, the Sabine, the Pearl, the Trinity, the Brazos, the Colorado in Texas, the Nueces, and the Rio Grande. While all of them are more or less important in navigation, those flowing through the arid region of the Great Plains serve for irrigation. Few of the rivers belonging to the Great Lake system are large, but the Saint Lawrence, which forms the outlet to the sea, has vast value in the industries as a highway of commerce. The larger of these rivers include the Saint Louis, the Maumee, and the Genesee.

The rivers of the Atlantic coast plain are characterized by an escarpment at from 40 to 100 miles from the sea, hence the navigation in most cases extends to that point. Many of them discharge by broad estuaries, which furnish fine harbors, such as those of the Delaware, the Hudson, and the Potomac. Only two of the rivers belonging to the Pacific slope are of large size, but many are important through their passage over escarpments, since they furnish an unlimited amount of water power. They are used largely for irrigation purposes

in the arid regions. The Columbia, in the northwest, and the Colorado, in the southeast, are the two largest. The Columbia is partly in Canada, receives the Snake, and discharges into the Pacific. The Colorado receives the Green. A part of its lower course is in Mexico, where it enters the Gulf of California. Three rivers of the extreme west are the Willamette, in Oregon, and the Sacramento and the San Joaquin, in California. The Great Basin system has no visible outlet to the sea, but many of the streams are of value in irrigation. Much of the drainage is into Great Salt Lake by numerous small streams, including the Sevier River. However, the largest stream of this section is the Humboldt, which disappears in Humboldt Lake.

LAKES. Small inland sheets of water are abundant in the northern section, especially in Michigan, Wisconsin, and Minnesota, each of which has many hundreds of fresh-water lakes. The Great Lakes in the north are lakes Superior, Huron, Erie, and Ontario, these forming a part of the northern boundary, and Lake Michigan, which lies wholly within the United States. Other well-known lakes are Moosehead, in Maine; Winnepesaukee, in New Hampshire; Champlain, between New York and Vermont; Onega, Cayuga, and Seneca, in New York; Okeechobee, in Florida; Winnebago, in Wisconsin; Pontchartrain, in Louisiana; Red, Leech, and Mille Lacs, in Minnesota; Devil's, in North Dakota; Flathead, in Montana; Yellowstone, in Wyoming; Utah, Sevier, and Great Salt Lake, in Utah; and Klamath, Tahoe, and Tulare, in California.

CLIMATE. The climate and soil of a region so vast as that included in the United States are necessarily diversified. In the southern part, as in California and Florida, the climate is almost tropical, but there is a gradual lowering of the temperature as we proceed toward the higher altitudes and toward the northern part of the country. However, every part of the United States has a climate favorable to Europeans. The winters are cold in the northern part, but not to such an extent that man and domestic animals are materially hindered in the enjoyment of life, while that region has peculiarly pleasant and agreeable summers. In the western highlands and the Great Plains rainfall is considerably limited, but all other sections have an abundance of moisture for the culture and maturity of cereal crops, grasses, vegetables, and fruits. The mean annual rainfall east of the Missouri and Mississippi is about 37 inches; between the Missouri and the western highlands, from ten to thirty inches; and in the western highlands, from five to twelve inches. However, some minor sections of this region, as in parts of Nevada, are practically rainless. The region lying along the Pacific coast, from the Bay of San Francisco to Vancouver Island, has an average rainfall of from 40 to 60 inches; the region from the Brazos River, Texas, to southern Virginia, from 40 to 58 inches, and that from southern Virginia to northeastern Maine, from 30 to 50 inches.

The mean annual temperature has a corresponding variation in the different sections of the country. It is about 70° in the southern parts which are not materially affected by elevation or sea breezes, 55° throughout the central region, and from 45° to 50° in the northern part. In the north central section the average minimum falls as low as 40° below zero, as in northern Minnesota and Wisconsin, where the extreme low temperature sometimes falls to 60° below zero. On the other hand, the highest temperature is reached in the drier parts of Arizona and Texas, where the thermometer rises as high as 115° to 120°. As a whole the climate is controlled largely by characteristic winds, but the storm centers which pass over the country originate almost equally on the Atlantic and the Pacific. The stormiest portion of the country is in the region of the Great Lakes, which is in the path of the movement of winds from the West Indies and the slopes of the Rocky Mountains. These winds cause a large range of temperature within the year, ranging from 60° in Florida to about 150° in the central part and the upper valley of the Missouri River.

The vast range of rainfall and temperature is important as a factor in the yield of agricultural products, for which the country is noted. The most productive lands lie along the eastern coast plain and the rivers of the great interior, but by far the largest scope of productive and arable land is within the Mississippi basin. Extensive regions of the western highlands have fertile soil, but lack a sufficient quantity of moisture, though there are large tracts entirely sterile, as large parts of the Utah basin. Vast scopes of country are fitted principally for grazing lands, as the plains of western South Dakota, Nebraska, Kansas, Oklahoma, eastern Colorado and Wyoming, and northwestern Texas.

NATURAL SCENERY. The United States is not surpassed by any other country in grand and beautiful scenery. Niagara Falls, the most noted cataract in America, is surpassed in height and the volume of water only by Victoria Falls, on the Zambezi. Yosemite Falls, in California, has a total height of 2,600 feet, in a series of three falls. The Falls of the Yellowstone, in Wyoming, is one of the wonders of the Yellowstone National Park. Shoshone Falls, on the Snake River, is next to Niagara among the falls of America in the volume of water passing over the precipice. The trip up the Hudson, from New York City to Albany, is rivaled only by that of the Rhine. Another trip of great beauty is from Portland, Ore., down the Willamette to the Columbia, thence up the Columbia to The Dalles, which

MAP TO SHOW THE ESTABLISHED AND PROPOSED FOREST RESERVES OF THE UNITED STATES.

for imposing scenery surpasses that of the Hudson. In the Appalachian Highlands are beautiful mountain lakes and deep gorges, through which clear streams wind like a silvery thread. The Water Gap, in the Delaware; the Pallisades, on the Hudson; and the Crawford Notch, in the White Mountains, are characteristic scenes of much grandeur. Other scenery of great beauty includes the Natural Bridge, in West Virginia; the Mammoth Cave, in Kentucky; the Grand Canyon, on the Colorado; the Whirlpool and Gorge, on the Niagara; and the Royal Gorge, in the Yosemite Valley. Yellowstone National Park, which is reserved by the government for the free use of the public, is a wonderland of canyons, waterfalls, geysers, and thermal springs.

Forests and Plant Life. The forests are peculiarly valuable and extensive. Scarcely any section of the country is entirely destitute of plant growth and the area of timber is proportionally large. Forests of valuable native woods are extensive throughout the regions which have an abundance of rainfall. They continue to yield large quantities of lumber and other timber products, and considerable growths of cedar and other evergreen trees are found even in the arid highlands of the West. All the section east of the Mississippi was formerly rich in primeval timber, fine tracts of which still remain in many sections, and a continuation of these forests extends into the section comprised in Missouri, Arkansas, Louisiana, Oklahoma, eastern Texas, eastern Kansas, and southern Iowa. The prairies of the northern Mississippi valley are enriched by belts of timber along the streams and in the western highlands are scattered tracts or belts, particularly in the cañons and valleys and on the mountain sides. In the region of the sources of the Mississippi and along the southern shore of Lake Superior splendid forests still abound. This is true also of Washington, Oregon, and California, where thrive the redwood and other great trees of the American continent.

Tree growth is limited most notably in the western sections of the great plains, though there are groups and belts of cottonwood, box elder, and willow trees along the streams, but in the *Llano Estacado,* or Staked Plains, of Texas and New Mexico, tree growth is very limited or entirely absent. Among the most abundant trees of North America are the oak, chestnut, beech, ash, black and white walnut, maple, hickory, locust, buckeye, laurel, cypress, azalea, magnolia, tulip, elm, pine, catalpa, cedar, arbor vitae, persimmon, redwood, guava, holly, acacia, fir, hackberry, pecan, birch, dogwood, palmetto, and hemlock spruce. The redwood and big tree, two species of the sequoia, found in California, are the largest trees of North America.

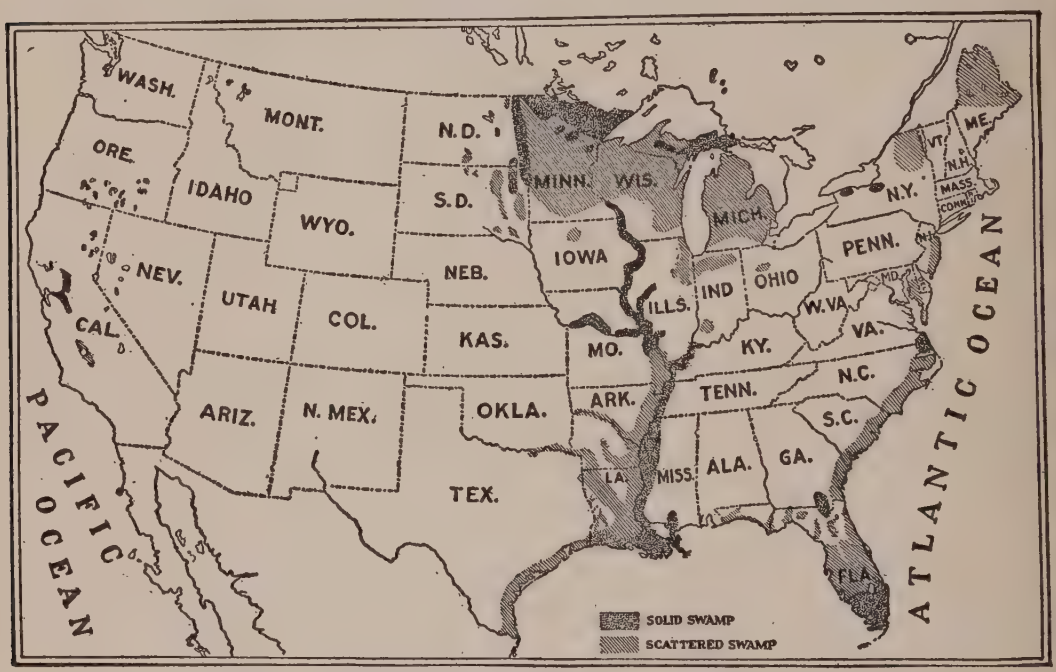
The plants which are native to the United States exceed in number those of Europe, the trees alone including about 400 species. As a whole the plant life is of the kind which characterizes the Temperate Zone, but it assumes a semitropical form in the southern part, as in Louisiana and Florida, where much of the vegetation resembles that of the West Indies. The native grasses are very numerous, ranging from the large forms of the Dismal Swamp to the small and highly nutritious buffalo grass of the arid regions of the West, but the latter in many sections is interspersed with cacti bunch grass, and sagebrush. Indian corn, or maize, and tobacco, two plants of high economic value, are native to the country. Practically all the more valuable commercial plants of Europe and Asia have been naturalized and are grown on a large scale, such as cotton, rye, oats, wheat, barley, clover, beans, oranges, lemons, etc.

Animal Life. Formerly vast herds of wild animals inhabited the different sections now comprised within the United States. Buffaloes, elks, deer, and antelopes were abundant in the Mississippi valley and the western plains, and great flocks of aquatic birds found their home in the interior waters. The rapid settlement and improvement of the country has caused the larger species of wild animals to become limited and at present only scattering remnants are found in different sections. The buffalo or bison has disappeared almost entirely, only small herds remaining in captivity and in the Yellowstone National Park. Elk, deer, antelopes, and kindred animals which were formerly very abundant, are now quite limited. Those remaining are confined largely to the mountains and highlands. Monkeys were never found in any part of the United States. The animals still quite abundant include the badger, bear, muskrat, wildcat, prairie dog, panther, skunk, rat, glutton, hare, lynx, raccoon, rabbit, mountain porcupine, mink, squirrel, woodchuck, fox, wolf, and cougar.

Many species of birds of song and plumage are native to the country, particularly in the Southern States, and aquatic birds are numerous in the watered and less populated districts. Among the edible birds are the duck, goose, snipe, grouse, prairie chicken, quail, plover, pigeon, partridge, brant, wild turkey, and sandpiper. Other birds more or less abundant are the humming bird, lark, heron, crane, coot, ibis, gull, mocking bird, finch, sparrow, flamingo, pelican, crow, hawk, owl, swallow, buzzard, falcon, woodpecker, vulture, and parrot. The alligator is found in the marshy regions of the Southeast, but it is becoming less numerous, being hunted for its skin. Lizards, tortoises, and turtles are common animals and serpents are indigenous to all sections, but they vary greatly in size and number with latitude and climatic conditions.

Fisheries. The fishing industry of the United States had its origin in New England during the colonial period, and the enterprise is of such extent that the country is not surpassed in the

value of the output. Although it seemed probable that some species might be exterminated from a lack of definite knowledge of methods of propagation, much has been done by the government and the states to obviate this difficulty. Hatcheries are maintained under the direction of the United States Fish Commission, by which extensive investigations and experiments are promoted. Both the interior waters and those lying off the coasts are valuable fishing grounds. Whaling was a productive enterprise until the middle of the 18th century, when the whale abandoned the waters off the coasts for seas farther north and south, but the catches of Alaska are still productive. The states that border on the Gulf, the Great Lakes, the Atlantic, and the Pacific have the largest fishing industries. Sponges and pearls are obtained off Florida and California. Lobsters and clams are taken off the coast of Maine, and the oyster industry is especially prolific in Chesapeake Bay and Long Island Sound. The salmon fisheries of the Columbia River and Alaska yield large returns and the buffalo, the cat, and the German carp are plentiful in many waters. Sealing is profitable in the Alaskan seas. The Great Lakes yield whitefish, lake trout, and herring. Cod, bluefish, halibut, and menhaden are among the leading fishes of the Atlantic. Other species include the mackerel, perch, mullet, shad, ray, eel, pike, carp, and scallops. About 214,500 persons are employed in fishing and the value of the output is $48,750,000 per annum.



MAP TO SHOW THE SWAMP LANDS OF THE UNITED STATES.

Mining. The mineral wealth is not only abundant, but the mines are worked with great success. It is estimated that the coal measures have an extent of 350,000 square miles. The finest anthracite coal deposits of the world are found in Pennsylvania, where gas and mineral oil are also abundant, and extensive deposits of bituminous coal are found in the region of the Appalachians, extending from New York to Alabama. Another vast belt of bituminous coal extends from Pennsylvania westward to Iowa eastern Kansas, and Oklahoma. Bituminous coal occurs in extensive deposits in various sections of Michigan and the western highlands especially in Wyoming, New Mexico, Montana Idaho, and Colorado. Lignite coal is produced in large quantities for fuel and steam in North Dakota and elsewhere. Petroleum and natural gas are abundant in the coal regions of Pennsylvania, West Virginia, Ohio, Indiana, Kentucky, Kansas, Texas, Oklahoma, Colorado, California, and other states. Lead deposits occur in Illinois, Missouri, Arkansas, and Iowa. Copper is found in the regions of Lake Superior, especially in Michigan, and in Montana and Arizona. Zinc occurs in Missouri, Pennsylvania, and New Jersey.

Iron is widely distributed, especially in the Appalachian highlands, in the Ozark Mountains of Missouri, in Georgia and Alabama, and in the iron range of Michigan and Minnesota. Gold and silver are found in Colorado, Wyoming, California, Nevada, New Mexico, Oregon, Montana, Utah, and a number of other states. Other minerals more or less widely distributed include

gypsum, marble, cobalt, iridium, nickel, copper, salt, salt rock, slate, limestone, granite, mercury, etc. Particular mention is made of the minerals found in the United States in the articles treating of gold, silver, iron, copper, etc., which see. The greatest development of mineral resources is in the states of the East and Central West and in the western highlands, but capital has been seeking investment in many of the Southern States, where the manufacturing and mining interests are developing with almost equal pace. No country of the world has excelled the United States in the employment of modern machinery in operating mines and utilizing their products.

Agriculture. The United States is the leading country of the world in the output of farm products, including live stock. It is characteristic of the people to invent and employ labor-saving machinery in working the land and in harvesting the crops. The natural result of this tendency has been to greatly increase the cultivated area. Much has been done by the government with this end in view, especially in that it has protected inventors by the granting of patents. Many swamp districts have been drained with the aid of the several states, or locally by counties, and both the national and state governments have expended large sums of money to irrigate lands which are naturally too dry for the germination and maturity of crops. Another prolific source has been through the maintenance of schools of agriculture, which have greatly facilitated adapting the crops as well as methods of cultivation to the peculiarities of various localities. This means has been especially useful in adapting the cultivation of certain species of rice and cotton in the South, in promoting agriculture by *dry farming* in the arid regions, and in extending the corn belt farther north and west than it was formerly supposed that this cereal could be grown profitably. Much has been done to extend the cultivation of the sugar beet, to promote interest in cultivating Kaffir corn and macaroni wheat in the arid regions, and to obtain species of fruits which are suitable to the different climatic conditions.

The capital invested in agriculture, including all interests for general farming and stock raising, is approximately $94,500,000,000, or two times the amount invested in manufacturing enterprises. According to the government reports, the farms average 146.6 acres. They are smallest in the North Atlantic and largest in the Western States, being 96.5 in the former and 386.1 acres in the latter. The number of farms is placed at 6,450,000, of which about 70 per cent. are worked by their owners. Iowa stands first in the per cent. of the total land area included in farms, which is 97.4 per cent., but in this respect it is followed closely by Illinois, Ohio, and Indiana. The largest scope of cultivated land is in the valley of the Mississippi, where the greatest interests are vested in practically every branch of farming, but various products are raised in large quantities on the Atlantic coast and on the Pacific slope. Gardening and orcharding are distinctive features of farming in the East, sugar cane and cotton culture in the South, tobacco in the central part of the Mississippi valley, cereals and hay in the Northwest, and fruits and cereals on the Pacific slope. Stock raising is a prolific enterprise in nearly all parts of the country, but the larger ranches are on the great plains, from the Gulf of Mexico to the border of the Dominion.

Cereals. Corn is the leading cereal grown in the United States and the crop usually ranges from 2,250,000,000 to 2,950,000,000 bushels per year. Illinois, Iowa, Kansas, Missouri, Nebraska, Indiana, and Ohio are the leading corn-producing states. Oats and wheat are next to corn in the number of bushels produced, each yielding from 500,000,000 to 775,000,000 bushels per year. North Dakota, Minnesota, Kansas, South Dakota, California, Nebraska, and Indiana are the principal wheat-producing states. However, this cereal can be grown successfully in every State in the Union. About half of the product is spring wheat. Iowa, Illinois, and Wisconsin are the leading oats-producing states and the total yield of the country is nearly two-thirds of the product of the world. Barley usually yields about 182,500,000 bushels per year and is grown most extensively in California, Minnesota, and Wisconsin. Rice is an important crop in South Carolina, Texas, Louisiana, North Carolina and Georgia. The annual yield is placed at 950,-500,000 pounds. Rye is used less extensively as a food than in Europe, hence the amount cultivated is comparatively much less than that of other important food products. Other cereals include buckwheat, Kaffir corn, and spelt.

Fruits. Fruit culture has developed more rapidly within the last decade than in any previous time in the history of the country. This is due chiefly to the fact that much of the product is transported in refrigerator cars, by which it has become possible to serve the semitropical fruits in a good condition on the table in the northern sections. Apples are grown more extensively than all other fruits combined and mature in nearly every section, but the largest orchards are in Washington, New York, Virginia, Pennsylvania, and the central part of the Mississippi valley, especially in Missouri and Illinois. Peaches take rank as the second crop and are grown in large orchards of the South, in the vicinity of the Great Lakes, and on the Pacific coast. Grapes of a fine quality thrive in New York and California and pineapples and oranges are grown extensively in Florida. Strawberries, raspberries, and blackberries are cultivated in most parts of the country. Large interests are vested in cultivating English walnuts, figs, almonds, lemons, and apricots, especially in California. Other fruits grown more or less ex-

tensively include peaches, quinces, pears, bananas, and cherries.

Cotton and Tobacco. The United States is the leading cotton-growing country of the world and has large tracts of land which are suitable for the cultivation of sea island and other standard species. The cotton belt extends throughout the South, from Kentucky to the Gulf and from the Atlantic to the western part of Texas. From 12,500,000 to 15,500,000 bales, of 500 pounds each, are produced per year. The yield in Texas is greater than that of any other State. Other cotton-producing states include Georgia, Mississippi, South Carolina, Alabama, Arkansas, and Oklahoma. On the other hand, Kentucky is the leading tobacco-producing State, though this distinction was long maintained by Virginia and later by North Carolina. Besides the three states already mentioned, others producing large quantities of tobacco are Wisconsin, South Carolina, Pennsylvania, New York, Maryland, and Connecticut. The yield ranges from 725,500,000 to 1,400,500,000 pounds per year and the value of the output usually approximates $298,500,000. Both cotton and tobacco are peculiar as economic products in that they furnish employment to an unusually large number of people.

Other Crops. Hay is one of the leading products in all parts of the country. Among the chief species of grasses grown for hay are timothy, native grasses, clover, alfalfa, millet, and red top. Potatoes stand at the head of the list among the vegetables, but the yield is not large as compared to that of the leading countries of Europe. More attention is given to this crop in the North than in any other section, especially in Minnesota, Wisconsin, Michigan, and New York. While the crop grown in the South is not materially large, it is important that a larger part of it is shipped to supply the early market in the North. Flax is grown extensively for seed in North Dakota, Minnesota, Wisconsin, and other states of the North. Hops is cultivated on the Pacific slope and in New York. Sweet corn, tomatoes, and other crops of this kind are grown on large tracts in the East, especially in Delaware and New Jersey, where they are either marketed or canned. Other crops of importance are sugar cane, hemp, peas, beans, melons, sweet potatoes, celery, sugar beets, onions, and cabbages.

Live Stock. The interests in stock raising are very extensive and, as compared with crop growing, they are much more important than in the countries of Europe. Cattle are the leading domestic animals and they are grown both for meat and dairy purposes. Farming as a whole is diversified in the country in general, but stock raising is largely an exclusive business in the arid region where cattle, sheep, and horses are reared on large ranches. Texas stands first in the number of cattle, while Iowa and Illinois lead the other states in the swine industry. Large dairying interests are maintained in New York, Iowa, Illinois, Wisconsin, Ohio, and New England. Kentucky is noted for its breeding farms of driving horses. The Northwest has a reputation for the industry of rearing Clydesdale and Percheron breeds for draft purposes. Mules are grown more extensively in the South than any other section of the country, being used more extensively in that section for draft purposes than elsewhere. The sheep industry is largely represented in all sections and the breeds are mostly merino and southdowns. Ohio and Texas formerly held first rank, but the leading place is now credited to Montana, and large interests in this enterprise are vested in Wyoming, Idaho, and New England. Other domestic animals include goats and poultry, especially chickens, turkeys, ducks, and geese. Ostrich farming is promoted to some extent in California. The value of all live stock is placed at $5,500,000,000, of which the larger part is invested in cattle, swine, and horses.

Manufactures. The United States ranks as the most important manufacturing country of the world, and the value of the output is greater than that of Germany and over a third larger than that of Great Britain. This is accounted for principally by the fact that the American people are not only inventive, but have at their command the natural resources necessary to promote this enterprise. The large quantities of coal, iron, timber, farm produce, and other materials, together with extensive water power and vast shipping facilities, are the causes that contributed to the development of many large industrial enterprises. Another factor is the fact that interstate commerce is absolutely unrestricted by a tariff or other influences that would tend to localize the market. Prior to the Civil War the manufacturing interests were confined almost exclusively to the East, partly because the transportation facilities were not developed in the West and South, but more recently this condition has been vastly revolutionized. Although the East still has a majority of the greater enterprises, it may be said that the larger factories are distributed generally in the towns and cities of the entire country. Georgia and Alabama have made remarkable strides in developing the cotton and iron industries, while North Carolina, South Carolina, and Kentucky maintain a high place in the manufacture of cotton textiles. Developments in similar lines have been made in the West and the Northwest, especially in such cities as Chicago, Saint Paul, Minneapolis, Saint Louis, Denver, Seattle, and San Francisco.

The leading manufactures include flour and grist, cured and packed meat, iron and steel, lumber and lumber products, cotton and woolen textiles, leather products, paper and paper pulp, and machinery. In the iron and steel industry it holds first rank. The annual output of iron is 36,775,000 metric tons, while the out-

put of steel is 40,780,000 metric tons. Germany more nearly approaches the output in this industry than any other country, producing 12,500,000 metric tons of steel and 10,225,000 metric tons of pig iron per year. Pennsylvania stands at the head of the iron and steel industry. Other states that take high rank in this enterprise include Ohio, Illinois, and Indiana, in the order named. The manufacture of cotton goods is centered largely in New England, but in this section Massachusetts has the largest annual output. Other states, not included in New England, that have large cotton mills are Alabama, Georgia, North Carolina, and South Carolina. Woolens and carpets are made chiefly in Massachusetts, Pennsylvania, and Rhode Island, and silk textiles are produced in large quantities in Pennsylvania and New Jersey.

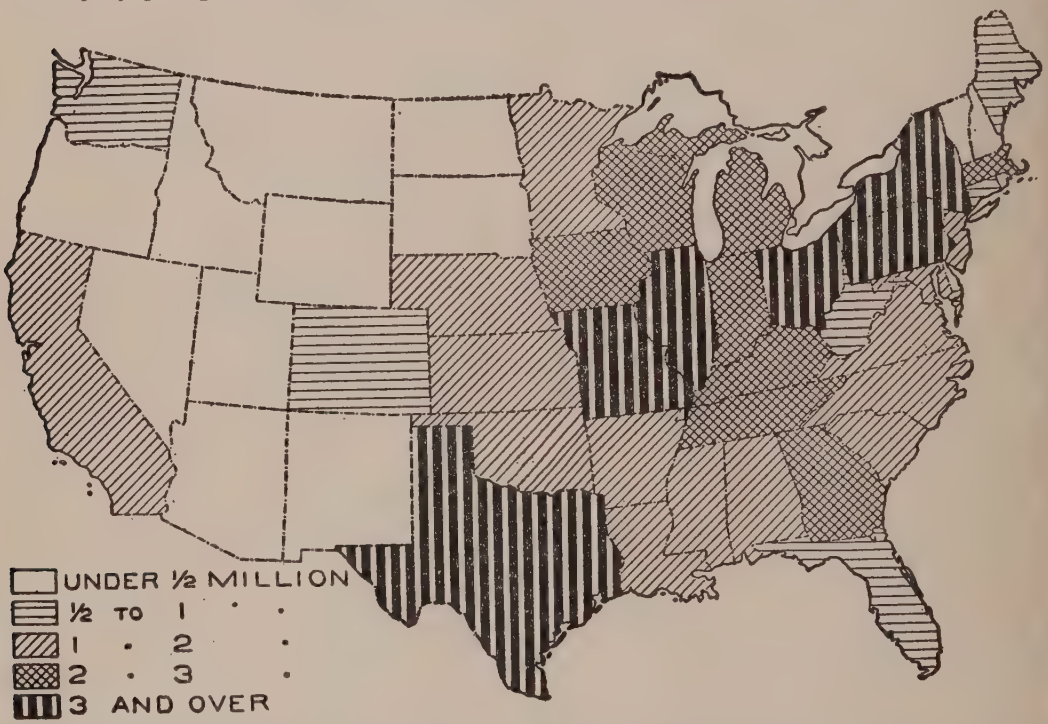
Slaughtering and meat packing are represented largely in the central west, owing to the convenience in shipping live stock to the packing-house centers. Chicago is unapproached by any other city in the world in the slaughtering and meat-packing enterprise. Other cities that rank high in this industry are Kansas City, South Omaha, Saint Louis, and Saint Joseph. About five-sixths of the product are sold fresh, being transported to markets in refrigerator cars, and the remainder is cured, though the proportion of cured pork is much greater than that of beef. Lumber and lumber products are obtained in various sections, especially in Minnesota, the Pacific slope, and the South. However, the paper industry is centered chiefly in New England, Pennsylvania, New York, and Wisconsin. Leather is made more extensively in Pennsylvania than any other State, but Massachusetts holds first rank in the output of boots and shoes. Though important as a shipbuilding country, it is exceeded in this respect by both Germany and Great Britain. However, in the production of farming machinery it surpasses every other country.

The output of dairy products has increased very rapidly with every decade and the returns from fresh milk, cheese, and canned milk are extensive. In this industry and a number of others, there has been a marked tendency to combine and operate the enterprises either on the basis of coöperation or by large corporations. The United States is second only to Germany in the value of chemical and allied products. It produces large quantities of clocks, needles, pins, musical instruments, and hardware. In printing and publishing it ranks high, especially in the output of daily newspapers, magazines, and standard books. The periodicals published have a value of $288,500,000, while book and job products aggregate $241,250,000. New York City has the largest daily newspapers, but the publishing interests are well distributed throughout the larger cities. Pottery, tile, glass, brick, and tobacco products are materially large. Other general manufactures include dyestuffs, explosives, fertilizers, paints and varnishes, rubber goods, hides, sugar, motor cars, radios, rayon, and preserved fish and fruits.

Commerce. In the volume of commerce the United States takes second rank, the aggregate value of all exports and imports being exceeded only by the total commerce of Great Britain. In 1925 the total exports were represented in value at $4,909,396,342, this being the largest volume of exportation by any country of the world, and in the same year the exports of France were $2,144,550,000 and those of Great Britain were $3,976,822,405. In the same year the imports aggregated in value $4,227,995,091, while the imports of France aggregated $2,076,180,000 and those of Great Britain $6,399,221,985. However, in the volume of the total trade, both foreign and domestic, the United States has the first place. Before the war the foreign trade in the order of value was with Great Britain, Germany, and France. Among the chief imports are India rubber, valued at $240,189,711; chemicals and drugs, $64,693,560; silk, $749,654,593; and sugar, $277,645,449. The chief exports include domestic animals, $15,728,281; copper manufactures, $171,225,291; breadstuffs, $534,732,910; iron and steel, $207,727,921; and unmanufactured cotton, $1,060,965,014. In the decade from 1890 to 1920 the agricultural products of the United States increased 25 per cent.; mining products, 51 per cent.; and manufactures, 198 per cent. This material enlargement of production is the best explanation for an increasing trade, though there has been a noticeable effect commercially by the tariff laws of France, Germany, and other countries competing with the United States in the commerce of the world.

Transportation. The transportation facilities surpass those of any of the leading nations. Besides its 24,500 miles of navigable rivers and interior and coastal waters, the country has the most extensive network of railroads in the world. Numerous canals are maintained to facilitate transportation. The canals utilized most extensively are the Welland Canal (Canadian), around the Falls of Niagara; the Erie Canal, connecting the Hudson and Lake Erie; the Chicago Drainage Canal, extending from Lake Michigan at Chicago; the Saint Mary's Canal, at Sault Sainte Marie, Michigan; and the Miami Canal, in Ohio. At present the railroad lines are given at about 251,690 miles, many of them double-track, making sufficient mileage to encircle the earth about ten times. It is estimated that one passenger is injured to 175,000 carried on the railways and one killed to every 2,267,250 passengers conveyed. The capital stock of all railroads is $17,276,524,380; the gross earnings, $5,590,550,000; and the net earnings, $987,013,895. Electric railways are in operation in all the cities with a population of about 10,000 or more. These are generally connected with suburban and interurban lines, the latter conveying passengers, mail, express, and freight.

The highways of the United States are not constructed and maintained by the national government, though formerly some roads of this class received attention. Among these was the Cumberland Road, a national highway from Maryland to Illinois. At present the maintenance of highways is a local enterprise, chiefly by townships, but also by counties and states. Generally the roads are well platted and worked by grading, but they are not improved as extensively by paving as is the case in Europe. In some sections, especially where the soil is rich and the rainfall is large, the roads get quite muddy and in a bad condition during the rainy season. Communication by telephone and telegraph is general throughout the country, and telephone lines are utilized extensively even in many sparsely settled districts. Express lines are operated generally in connection with railways and steamboat transportation, while the postal system is managed by the government. Practically all the cities with a population of 8,000 have free delivery and rural free delivery routes are maintained in the more densely settled country districts, though this branch of the postal system is not as well represented as in European countries.



Map to show the Relative Population of the States. Ten States—that is, California, Illinois, Massachusetts, Michigan, Missouri, New Jersey, New York, Ohio, Pennsylvania, and Texas—each have over 3,000,000 Inhabitants.

Population. The census of 1900 accords the United States, including Alaska, a population of 76,303,387. This embraces a total colored population of 9,312,585, or 12.2 per cent., of which 85,986 were Japanese; 119,050, Chinese; 266,760, Indians; and 8,840,789, Negroes. The colonial possessions had a population of 8,972,655, thus giving the nation a total population of 85,276,042. In 1910, according to the Federal census, the United States, exclusive of Alaska and the colonies, had a population of 91,972,266. Washington, D. C., on the Potomac River, is the capital. In 1920 fifty cities had a population over 130,000, as is shown in the table below. The states in which the cities are located are indicated by the contractions or abbreviations of their names as generally used in writing or printing:

CITY.	STATE.	POPULATION.
New York	N. Y.	5,620,048
Chicago	Ill.	2,701,705
Philadelphia	Pa.	1,823,779
Detroit	Mich.	993,678
Cleveland	O.	796,836
St. Louis	Mo.	772,897
Boston	Mass.	748,060
Baltimore	Md.	733,826
Pittsburgh	Pa.	588,193
Los Angeles	Cal.	576,673
Buffalo	N. Y.	506,775
San Francisco	Cal.	506,676
Milwaukee	Wis.	457,147
Washington	D. C.	437,408
Newark	N. J.	414,216
Cincinnati	O.	401,247
New Orleans	La.	387,408
Minneapolis	Minn.	380,582
Kansas City	Mo.	324,410
Seattle	Wash.	315,652
Indianapolis	Ind.	314,194
Jersey City	N. J.	298,079

Population—*Continued.*

CITY.	STATE.	POPULATION.
Rochester	N. Y.	295,750
Portland	Ore.	258,288
Denver	Col.	256,491
Toledo	O.	243,109
Providence	R. I.	237,506
Columbus	O.	237,031
Louisville	Ky.	234,891
St. Paul	Minn.	234,595
Oakland	Cal.	216,361
Akron	O.	208,435
Atlanta	Ga.	200,616
Omaha	Neb.	191,601
Worcester	Mass.	179,754
Birmingham	Ala.	178,270
Richmond	Va.	171,667
Syracuse	N. Y.	171,647
New Haven	Conn.	162,519
Memphis	Tenn.	162,351
San Antonio	Tex.	161,379
Dallas	Tex.	158,976
Dayton	O.	152,559
Bridgeport	Conn.	143,152
Houston	Tex.	138,276
Hartford	Conn.	138,036
Scranton	Pa.	137,700
Grand Rapids	Mich.	137,634
Paterson	N. J.	135,866
Youngstown	O.	132,358

INCREASE IN POPULATION.—At the time of the Revolutionary War about one-fifth of the people were of foreign birth, but the greatest number of immigrants in any one year came to the country in 1903, when 857,046 foreigners landed at the ports. In that year the largest number of immigrants came from Italy, Russia, Sweden-Norway, Germany, and Ireland. However, the American people are made up largely from the descendants of Germans, English, Irish, Scotch, French, Scandinavians, in the order named. The immigrants from Western Europe have been numerous throughout the existence of the Republic, but more recently, especially since 1890, large numbers have come from Italy, Poland, Greece, and the Balkan states. At the time of the first census, in 1790, the center of population was 23 miles east of Baltimore, Md. Since then there has been a constant movement toward the West, to which both the people of the United States and Europe have been attracted by larger opportunities in acquiring land and advantages in various industrial enterprises. However, the population of the cities has increased more rapidly than that of the country, and this is true in nearly every decade of national growth. The following table contains the entire population at the time of each national census, together with the number and the per cent. of the urban population:

YEAR.	POPULATION.	POPULATION LIVING IN CITIES.	INHABITANTS OF CITIES in EACH 100 OF THE TOTAL POPULATION.
1790....	3,929,214	131,472	3.35
1800....	5,308,483	210,873	3.97
1810....	7,239,881	356,920	4.93
1820....	9,633,822	475,135	4.93
1830....	12,866,020	1,864,509	6.72
1840....	17,069,453	1,453,994	8.52
1850....	23,191,876	2,897,586	12.49
1860....	31,443,321	5,072,256	16.13
1870....	38,558,371	8,071,875	20.93
1880....	50,155,783	11,318,547	22.57
1890....	62,622,250	18,284,385	29.20
1900....	76,303,387	30,797,185	40.50
1910...	91,972,266	42,623,383	46.30
1920...	105,683,108	54,304,603	51.40

LANGUAGE. English is the spoken and the official language. In 1900 there were 1,403,212 persons over ten years of age who were unable to speak English, but the number who can use other languages is vastly larger. Those who are unable to use the national language consist principally of Italians, Hebrews, Poles, Chinese, and Indians. Among the leading languages spoken aside from the English are German, French, Italian, Spanish, Polish, Scandinavian, Slovak, and Hebrew. However, the system of State schools maintained everywhere facilitates learning the English very rapidly, especially by the young. Another element contributing to the use of one language is the fact that no large scope of country anywhere is populated exclusively by a single race, but instead all races are quite generally distributed, or are freely intermixed. People of British and German descent are found in all sections of the country, while the Scandinavians are confined largely to the Northwest, the Hebrews to the larger cities, the Spanish to the Southwest, the French to Louisiana and some sections of the East, and the Greeks and Italians to the manufacturing and industrial centers. The English spoken differs in accent very noticeably from that of England and is somewhat characterized by local peculiarities, as the distinguishing form of expressions heard in New England and in the South. However, the printed form and the language as taught in the schools are absolutely uniform.

GOVERNMENT. The government of the United States is administered through three distinct and separate branches. These are the legislative, or lawmaking power; the executive, or law-inforcing power; and the judicial, or law-interpreting power. The *legislative* branch is vested in the Congress, which consists of a Senate and House of Representatives; the *executive,* in a President; and the *judicial,* in the Federal courts of law. After the United States secured its independence, from 1778 until 1789, the states were governed by the Articles of Confederation, which provided a government unsatisfactory to the newly formed and developing country. Accordingly the present Constitution was devised and adopted by a constitutional convention that met at Philadelphia, Pa., on May 25, 1787. George Washington was president of the convention and the new Constitution was adopted by that body on Sept. 17, 1787. It went into effect on March 4, 1789. Since then seventeen amendments have been made to the Constitution. The gold dollar, comprised of 100 cents, is the standard monetary unit.

EXECUTIVE DEPARTMENT. The President is the chief executive, and he is succeeded by the Vice President in case of death or removal by impeachment. Both are elected for a term of four years by the people through an electoral college, formed in each State, and composed of electors equaling the number of senators and representatives sent by the State to Congress. The President, who has his residence at the White House in Washington, D. C., receives a

salary of $75,000 a year. His general duties are to execute the laws. Though he is commander in chief of the army and navy of the United States, he does not appear at the head of these departments. He may conclude treaties by and with the consent of the Senate, make nominations and appointments for public offices, inform Congress of the state of the Union by messages, and convoke Congress in special session. While he may veto measures enacted by Congress, yet a bill may be passed by a two-thirds vote in each house of Congress and become a law without his sanction.

The Vice President is president of the Senate and receives a salary of $12,000 per year. Both the President and Vice President are eligible to office under the same conditions; namely, that they are born within the jurisdiction of the United States, have attained to the age of 35 years, and have been 14 years resident within the United States. In case both the President and Vice President die or are removed by conviction on impeachment, the cabinet officers succeed to the Presidency in the following order: Secretary of State, of the Treasury, of War, Attorney-General, Postmaster-General, Secretary of the Navy, and Secretary of the Interior.

The presidents are as follows:

NAMES.	ELECTED FROM	PARTY.	DATE OF INAUGURATION.
George Washington...	Va.	Federalist.	April 30, 1789
John Adams.....	Mass.	Federalist.	March 4, 1797
Thomas Jefferson.....	Va.	Democrat.	March 4, 1801
James Madison.....	Va.	Democrat.	March 4, 1809
James Monroe.....	Va.	Democrat.	March 4, 1817
John Quincy Adams.	Mass.	National-Republican.	March 4, 1825
Andrew Jackson.....	Tenn.	Democrat.	March 4, 1829
Martin Van Buren....	N. Y.	Democrat.	March 4, 1837
Wm. H. Harrison.....	Ohio	Whig.	March 4, 1841
John Tyler	Va.	Whig.	April 6, 1841
James K. Polk.....	Tenn.	Democrat.	March 4, 1845
Zachary Taylor.....	La.	Whig.	March 5, 1849
Millard Fillmore.....	N. Y.	Whig.	July 9, 1850
Franklin Pierce.....	N. H.	Democrat.	March 4, 1853
James Buchanan	Pa.	Democrat.	March 4, 1857
Abraham Lincoln.....	Ill.	Republican.	March 4, 1861
Andrew Johnson.....	Tenn.	Democrat.	April 15, 1865
Ulysses S. Grant.....	Ill.	Republican.	March 4, 1869
Rutherford B. Hayes..	Ohio.	Republican.	March 5, 1877
James A. Garfield.....	Ohio.	Republican.	March 4, 1881
Chester A. Arthur.....	N. Y.	Republican.	Sept. 20, 1881
Grover Cleveland.....	N. Y.	Democrat.	March 4, 1885
Benjamin Harrison....	Ind.	Republican.	March 4, 1889
Grover Cleveland.....	N. Y.	Democrat.	March 4, 1893
William McKinley....	Ohio	Republican.	March 4, 1897
Theodore Roosevelt....	N. Y.	Republican.	Sept. 14, 1901
William H. Taft.....	Ohio.	Republican.	March 4, 1909
Woodrow Wilson...	N. J.	Democrat	March 4, 1913
Warren G. Harding..	Ohio	Republican	March 4, 1921
Calvin Coolidge.....	Vt.	Republican	Aug. 2, 1923

The President is assisted in the discharge of his duties by ten cabinet officers, who are the heads of the different departments of the government. These include secretaries of State, of the Treasury, of War, of the Interior, of the Navy, of Agriculture, of Commerce, of Labor, Postmaster-General, and Attorney-General. Among the chief duties of these officials are to advise with the President and make reports to him relative to the state of affairs in their respective departments. Their general duties are discussed under United States Departments of, which see. The salary is $12,000 per year and the term of office is dependent upon the incumbency of the President, who appoints them subject to approval by the Senate.

Below is a complete list of the vice presidents, together with the presidents serving at the same time, and the years of their birth and death:

VICE-PRESIDENTS.	ELECTED FROM	PRESIDENT.	BORN.	DIED.
John Adams.....	Mass.	Washington.	1735	1826
Thomas Jefferson.....	Va.	John Adams.	1743	1826
Aaron Burr.....	N. Y.	Jefferson.	1756	1836
George Clinton.....	N. Y.	Jefferson and Madison.	1739	1812
Elbridge Gerry.....	Mass.	Madison.	1744	1814
Daniel D. Tompkins..	N. Y.	Monroe.	1774	1825
John C. Calhoun.....	S. C.	J. Q. Adams.	1782	1850
Martin Van Buren....	N. Y.	Jackson.	1782	1862
Richard M. Johnson...	Ky.	Van Buren.	1780	1850
John Tyler.....	Va.	Harrison.	1790	1862
George M. Dallas.....	Penn.	Polk.	1792	1864
Millard Fillmore.....	N. Y.	Taylor.	1800	1874
William R. King.....	Ala.	Pierce.	1786	1853
John C. Breckenridge..	Ky.	Buchanan.	1821	1875
Hannibal Hamlin.....	Me.	Lincoln.	1809	1891
Andrew Johnson.....	Tenn.	Lincoln.	1808	1875
Schuyler Colfax.....	Ind.	Grant.	1823	1895
Henry Wilson.....	Mass.	Grant.	1812	1875
William A. Wheeler..	N. Y.	Hayes.	1819	1887
Chester A. Arthur.....	N. Y.	Garfield.	1830	1886
Thomas A. Hendricks.	Ind.	Cleveland.	1819	1885
Levi P. Morton.....	N. Y.	Harrison.	1824	1920
Adlai E. Stevenson....	Ill.	Cleveland.	1835	1914
Garrett A. Hobart....	N. J.	McKinley.	1844	1899
Theodore Roosevelt...	N. Y.	McKinley.	1858	1919
Charles W. Fairbanks	Ind.	Roosevelt.	1852	1918
James S. Sherman...	N. Y.	Taft.	1855	1912
Thomas R. Marshall.	Ind.	Wilson.	1854	1925
Calvin Coolidge.....	Vt.	Harding.	1872	
Charles G. Dawes....	Ill.	Coolidge.	1865	

LEGISLATIVE DEPARTMENT. Congress is composed of senators, two of whom are elected by the Legislature of each State, and of representatives, who are chosen by the electors of the several states, the number depending upon the population. At present the Senate is constituted of 96 members and the House of 435 members. This makes the basis of representation in the House 211,430, but each State is entitled to at least one representative. See **Congress.**

JUDICIAL DEPARTMENT. The judicial department of the national government is vested in a Supreme Court, having a chief justice and eight associate justices, and in the circuit courts of appeal, circuit courts of the United States, district courts of the United States, and the supreme court of the District of Columbia. Congress has power to establish and organize all the courts except the Supreme Court, which is established by the Constitution, and the judges of these courts are nominated by the President subject to confirmation by the Senate. The government of each State, like that of the nation, is composed of the three departments, executive, legislative, and judicial, most of the State officers being elective by the people. See **City; County; State.**

ARMY AND NAVY. The military forces of the United States have varied considerably within recent years, owing to the war with Spain and a number of garrisons that are maintained in the colonies. At present the peace footing, including the colonial troops, is limited to 225,000

(Art. United States)

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men; in 1917 and 1918, under the conscription law, 23,456,021 men were registered. In addition to the national army each state has a militia. All able-bodied men between the ages of 21 and 45 years are liable to military duty in case of emergency. The navy has been materially increased within recent years and now consists of 225,000 men and about 300 vessels. It includes forty battleships, thirty protected cruisers, seventy destroyers, twelve monitors, thirty torpedo boats, fifty submarines, and a number of vessels of different minor classes. The Krag-Jorgensen rifle has been used largely in the army, but it has been superseded by the Springfield model of 1903. The President is the commander of both the army and the navy. See **United States Military Academy.**

EDUCATION. The educational affairs of the United States are largely under the direction of the several states. In this respect the public schools are quite like the statal system of Germany. Each State has a system of elementary and public high schools. The State institutions of higher learning are maintained by taxation and appropriations under the laws of the respective states. The elementary schools have courses of study in all grades from the kindergarten to the high school, while the high schools are designed to prepare for the higher institutions, and the latter fit for entrance into the university. A superintendent of public instruction or a commissioner of education, assisted by county and city superintendents, has general supervision of the educational affairs of the State. In each State are a number of very excellent private denominational and sectarian colleges, and in many of them universities, supported either wholly or in part by endowments. However, the national government has made liberal appropriations for the support of universities, industrial schools, and institutions disseminating knowledge in agriculture and mechanical arts. The support given by the national government to these institutions includes 75,000,000 acres of the public domain, besides appropriations made by Congress from the public funds. Similar public grants have been made to support a naval and military academy, two institutions of public interest constituting the only ones under direct supervision of the national government.

The Bureau of Education is maintained under the Department of the Interior, of which the Commissioner of Education is the chief officer, whose duty is to diffuse information and gather statistics. He publishes from time to time reports upon educational questions, makes public addresses, and issues circulars relative to interests connected with public intelligence. The Signal Service Bureau, the Smithsonian Institution, a national observatory, and commissions to make scientific inquiry and historical research are maintained by the nation. Special commissions to make geographical, geological, and naval surveys and explorations are other enterprises supported by the national government. The educational interests are at present in the highest state of development in the regions of the Central West. This is true especially in the rudiments of education and educational arts, while the lowest ebb in public instruction prevails in some of the Southern States, a condition to be expected after the long enslavement of the Negroes. However, the impetus resulting from the long period of prosperity since the Civil War, which extended from 1861 to 1865, is fast displacing the barriers and promulgating intelligence. Attendance upon public schools is alike free to all. A limited compulsory attendance law is on the statute books of most of the states, requiring attendance usually from the age of eight to fourteen years. In a number of the Southern States separate schools are maintained for the children of white and colored families.

LITERATURE. See **American Literature.**

RELIGION. The free exercise of religious belief and worship is guaranteed by the Constitution of the United States and by the constitutions of the individual states. However, it is made obligatory to observe one weekly holiday by refraining from pursuing the ordinary avocations, but individuals are given the right to observe either Sunday or Saturday as the Sabbath. Practically all the religious denominations of the world are represented, the actual church membership being 40,120,000. The proportion of Protestants to Roman Catholics is about four to one. The numerical order of the larger bodies is approximately in the following order: Roman Catholics, Methodists, Baptists, Lutherans, Presbyterians, Disciples of Christ, Episcopalians, Congregationalists, Latter Day Saints, German Reformed, United Brethren, German Evangelical, Jews, Universalists, Friends, Greek Catholics, Christian Scientists, and Spiritualists. Many institutions of secondary and higher learning are maintained by the religious bodies.

POLITICAL DIVISIONS. The United States proper consists of forty-eight States and the District of Columbia. Besides these is Alaska, which is organized as a Territory. Many of the State boundary lines are formed by rivers, lakes, and other natural lines of demarkation. For this reason they are somewhat irregular, only four divisions cornering at the same point, these being Colorado, Utah, Arizona, and New Mexico. Each State is guaranteed a republican form of government by the national Constitution, and is limited in various respects by that fundamental law in its general rights and powers. Below is a complete list of the states in the order in which they came into the Union, the first thirteen named being the original states, hence the date given is that on which the Constitution was ratified. The numbers to the right represent the number of electors to which the states are entitled, which are equal to the two

senators and the several representatives sent by the states to the national Congress:

NO.	NAMES OF STATES.	DATES OF RATIFICATION OR ADMISSION.	CAPITALS.	ELECTORS.
1	Delaware	Dec. 7, 1787	Dover	3
2	Pennsylvania	Dec. 12, 1787	Harrisburg	38
3	New Jersey	Dec. 18, 1787	Trenton	14
4	Georgia	Jan. 2, 1788	Atlanta	14
5	Connecticut	Jan. 9, 1788	Hartford	7
6	Massachusetts	Feb. 6, 1788	Boston	18
7	Maryland	Apr. 28, 1788	Annapolis	8
8	South Carolina	May 23, 1788	Columbia	9
9	New Hampshire	June 21, 1788	Concord	4
10	Virginia	June 25, 1788	Richmond	12
11	New York	Jul. 26, 1788	Albany	45
12	North Carolina	Nov. 21, 1789	Raleigh	12
13	Rhode Island	May 29, 1790	Providence	5
14	Vermont	Mar. 4, 1791	Montpelier	4
15	Kentucky	June 1, 1792	Frankfort	13
16	Tennessee	June 1, 1796	Nashville	12
17	Ohio	Feb. 19, 1803	Columbus	24
18	Louisiana	Apr. 30. 1812	Baton Rouge	10
19	Indiana	Dec. 11, 1816	Indianapolis	15
20	Mississippi	Dec. 10, 1817	Jackson	10
21	Illinois	Dec. 3, 1818	Springfield	29
22	Alabama	Dec. 14, 1819	Montgomery	12
23	Maine	Mar. 15, 1820	Augusta	6
24	Missouri	Aug. 10, 1821	Jefferson City	18
25	Arkansas	June 15, 1836	Little Rock	9
26	Michigan	Jan. 26, 1837	Lansing	15
27	Florida	Mar. 3, 1845	Tallahassee	6
28	Texas	Dec. 29, 1845	Austin	20
29	Iowa	Dec. 28, 1846	Des Moines	13
30	Wisconsin	May 29, 1848	Madison	13
31	California	Sept. 9, 1850	Sacramento	13
32	Minnesota	May 11, 1858	Saint Paul	12
33	Oregon	Feb. 14, 1859	Salem	5
34	Kansas	Jan. 29, 1861	Topeka	10
35	West Virginia	Jun. 19, 1863	Charleston	8
36	Nevada	Oct. 31, 1864	Carson City	3
37	Nebraska	Mar. 1, 1867	Lincoln	8
38	Colorado	Aug. 1, 1876	Denver	6
39	North Dakota	Nov. 2, 1889	Bismarck	5
40	South Dakota	Nov. 2, 1889	Pierre	5
41	Montana	Nov. 8, 1889	Helena	4
42	Washington	Nov. 11, 1889	Olympia	7
43	Idaho	Jul. 3, 1890	Boise City	4
44	Wyoming	Jul. 10, 1890	Cheyenne	3
45	Utah	Jan. 4, 1896	Salt Lake City	4
46	Oklahoma	Nov. 16, 1907	Oklahoma City	10
47	New Mexico	Jan. 6, 1912	SantaFe	3
48	Arizona	Feb. 14, 1912	Phoenix	3
				531

Alaska, purchased of Russia in 1867 and organized as a territorial government in 1884, is a Territory. It has a delegate representative to Congress, who may speak upon questions, but is not allowed a vote in that body. The government is administered in the territories by a Territorial Legislature chosen by popular vote, but the Governor is nominated by the President, subject to approval by the Senate. Congress has direct charge of the District of Columbia, and those residing within its boundary are not privileged to take part in the national elections. The colonies are governed similarly to the territories and have local privileges as to the management of affairs pertaining to education, internal improvements, and other matters of local interest. The states and the surveyed portions of territories are divided into counties, usually consisting of sixteen townships, and each township consisting of 36 sections. A section of land comprises 640 acres, which is again subdivided into quarters or smaller divisions. Congress has power to admit new states formed from territory of the United States. The admission of a Territory as a State is dependent mainly upon its population and apparent ability to support a State government and maintain its authority.

The table below contains a list of the states, together with their area and population:

NO.	NAME.	SQUARE MILES.	POPULATION, 1920
1	Alabama	52,250	2,347,295
2	Arizona	113,020	333,273
3	Arkansas	53,850	1,750,995
4	California	158,360	3,426,536
5	Colorado	103,925	939,376
6	Connecticut	4,990	1,380,585
7	Delaware	2,050	223,003
8	Florida	58,680	966,296
9	Georgia	59,475	2,894,683
10	Idaho	84,800	431,826
11	Illinois	56,650	6,485,098
12	Indiana	36,350	2,939,544
13	Iowa	56,025	2,403,630
14	Kansas	82,080	1,769,257
15	Kentucky	40,400	2,416,013
16	Louisiana	48,720	1,797,798
17	Maine	33,040	768,014
18	Maryland	12,210	1,449,610
19	Massachusetts	8,315	3,852,356
20	Michigan	58,915	3,667,222
21	Minnesota	83,365	2,386,371
22	Mississippi	46,810	1,789,384
23	Missouri	69,415	3,403,547
24	Montana	146,080	547,593
25	Nebraska	77,510	1,295,502
26	Nevada	110,700	77,407
27	New Hampshire	9,305	443,083
28	New Jersey	7,815	3,155,374
29	New Mexico	122,580	360,247
30	New York	49,170	10,384,144
31	North Carolina	52,250	2,556,486
32	North Dakota	70,795	645,730
33	Ohio	41,060	5,759,368
34	Oklahoma	70,057	2,027,564
35	Oregon	96,030	783,389
36	Pennsylvania	45,215	8,720,159
37	Rhode Island	1,250	604,397
38	South Carolina	30,570	1,683,662
39	South Dakota	77,650	635,839
40	Tennessee	42,050	2,337,459
41	Texas	265,780	4,661,027
42	Utah	84,970	449,446
43	Vermont	9,565	352,421
44	Virginia	42,450	2,306,361
45	Washington	69,180	1,356,316
46	West Virginia	24,780	1,463,610
47	Wisconsin	56,040	2,631,839
48	Wyoming	97,890	194,402

HISTORY. The history of the United States in a wider sense dates from the discovery of America by Christopher Columbus, who set foot upon land in the new world on Oct. 12, 1492. However, it is reasonable to assume that earlier discoveries were made by Norsemen and Scandinavians. Eric the Red, a Norseman, is thought to have discovered Greenland in 985. Lief Ericsson, son of Eric the Red, sailed from Norway to Iceland in 1000 and the following year came to the northeastern coast of North America. These discoveries are mentioned in the Sagas, but little accurate knowledge can be obtained of them, aside from the fact that America was visited by these navigators, though their discoveries and explorations bore no material fruit. Owing to this, it is safe to assume that American history dates from 1492, though Columbus did not visit the mainland of North America. Sebastian Cabot, an English explorer, cruised along the northeastern coast of North America in 1498, exploring it from Virginia to Labrador. Ponce de León landed near Saint Augustine. Fla., in 1513, and penetrated inland in search of

a fountain that had the power to confer perpetual youth upon those who would partake of its water.

Colonization. The first settlements within the region now included in the United States were made by the Spaniards. They built forts and founded colonies at Saint Augustine in 1565, and at Santa Fé, N. M., in 1605. The earliest permanent English settlement was made at Jamestown, Va., in 1607, under the direction of the London Company. Soon after, in 1613, the Dutch settled at New York, then called the New Netherlands, and the Massachusetts Colony at Plymouth was established in 1620. French explorers penetrated to the region of the Great Lakes and the Mississippi, the latter being explored by La Salle in 1682. Permanent settlements were made soon after at Kaskaskia, Ill., and Mobile, Ala. The Swedes had colonies on the Delaware and Hudson, but they were deprived of their lands by the Dutch in 1655, when they were compelled to surrender to an army sent from New Amsterdam, now New York City.

Subsequently the English and Dutch became involved in boundary disputes, giving rise to serious trouble between the two claimants, and the Duke of York, in 1664, captured the Dutch possessions, annexing them to those of the English. This resulted in the claims to territory in America being limited to the English, Spanish, and French. The Spanish settlements were confined to the southeastern part; the French settlements extended to the northeastern region and the territory contiguous to the Great Lakes and the Mississippi; while the English claims extended from Florida to Nova Scotia. Steadily the English extended their settlements toward the interior, pressing before them the Indians and confining the Spanish and French to narrower limits. However, the English colonies were not united by any ties of material effect until 1688, when settled and uniform relations were established.

The Treaty of Utrecht, in 1713, gave a monopoly of the slave trade to England, which, since the reign of Elizabeth, had imported slaves from Africa into the colonies of America and the West Indies. It likewise gave England possession of Acadia, which long had been an object of contention with the French. King George's War, known in Europe as the War of the Austrian Succession, witnessed the loss of Louisburg to the French, but the Treaty of Aix-la-Chapelle ceded it back to France. The French and Indian War was the next contest for supremacy. The English under Braddock sustained a defeat at Fort Duquesne in 1755, but the tide of war turned in their favor, and General Wolfe with an English army defeated the French under General Montcalm in a decisive battle on the Plains of Abraham, near Quebec, on Sept. 13, 1759. Both generals fell in the battle, but it was the engagement that lost Canada and the Atlantic coast to the French. As a result France ceded all the lands east of the Mississippi to England, thus giving that country possession of all the eastern part of North America north of Florida and Louisiana.

Colonial Government. The English possessions of North America, which are at present included in the United States, were divided into thirteen colonies, each coinciding more or less with the states now bearing their names. These colonies were Delaware, Pennsylvania, Georgia, New Jersey, Massachusetts, Connecticut, South Carolina, Maryland, Virginia, North Carolina, New York, Rhode Island, and New Hampshire. The government of the colonies was administered by England through a resident governor and other officers appointed by the crown. However, the government was administered under the general theory that the colonies belong to the mother country as a matter of right and may exercise no commercial or political right, except such as may be granted to them by the home government. This theory, although it was accepted by the leading nations at that time, was the occasion of much contention in America, where the sturdy pioneers began to assert a spirit of unrest and revolution. Finally, being burdened by excessive taxation, which the English levied to aid in defraying the expenses of the war with the French, the colonies gradually became dissatisfied and began to organize for establishing an independent government.

Revolutionary War. When the colonists resisted the policy of the home government, they were met by retaliatory measures, such as were designed to compel obedience to the laws. These hastened the events that caused the Revolutionary War. A number of garrisons were established in the meantime by the British and the colonists were taxed to support them. Other causes of the Revolution included the Importation Act of 1733, the Writs of Assistance in 1761, and the Stamp Act of 1765. These led to the Tea Party, the Boston Massacre, and an order issued to General Gage commanding that force should be used in subduing the colonists. Petitions for redress were sent in vain to George III. and on Sept. 5, 1774, the First Continental Congress met in Philadelphia. This assemblage made a declaration of rights, but the British Parliament obstinately refused to make concessions.

The first hostilities between the continentals and the British regulars broke out on April 19, 1775, at Lexington, and soon after the colonists were defeated at Bunker Hill. On May 10, 1775, the Second Continental Congress convened at Philadelphia and made provisions for securing the united action of the colonies. It again petitioned the king and British people for redress, but provided for actual war and selected George Washington as commander in chief for the defense of American liberty. The Declaration of Independence was adopted by a unanimous vote

on July 4, 1776, and that document named the country the United States of America. Most of the seaport cities were captured by the British, but the Americans held the interior and recaptured some of the cities. The first decisive battle and the one which is considered the turning point of the war occurred at Saratoga, Oct. 17, 1777, when General Burgoyne surrendered with a large army to General Gates.

The colonists were assisted by a number of French, German, and Polish officers, and French troops came to their assistance. Cornwallis was pressed by Washington and Lafayette and finally surrendered at Yorktown on Oct. 19, 1781, thus ending the war. Peace was concluded in November, 1782, and the final treaty of peace was signed at Versailles, France, on Sept. 3, 1783, by which Great Britain formally acknowledged the independence of the United States. Counting from the Battle of Lexington to the official proclamation of the cessation of hostilities, in 1783, the Revolutionary War extended over a period of eight years. The American troops engaged in the Revolution included 232,000 regular soldiers and 55,500 militia, while the British had an army of 115,000 men and officers and a navy of 22,500 men. About 5,000 French soldiers fought on the American side, and further assistance was given to the colonists by an alliance between Spain and France against England. The British had a navy of 130 vessels and many transports, while the Americans had only seventeen vessels at the beginning of the war. However, Paul Jones and other privateers captured a number of British vessels and almost destroyed the British commerce.

Independent Government. As soon as the colonies obtained an independent government they turned their attention to organizing civil institutions and developing internal resources. The Articles of Confederation, adopted in 1777, soon proved unsatisfactory and movements were organized for obtaining a more stable plan of government. In 1787 the Constitution was prepared, which went into effect March 4, 1789. The preamble to that document declares its object, and is as follows: "We, the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America." The first Congress under the Constitution met April 6, 1789, and on April 30 of the same year George Washington and John Adams were inaugurated as President and Vice President. England, humiliated by defeat in America, continued to display a spirit of hostility. That country claimed the right of searching American ships and impressing into the British service persons who had formerly been British subjects.

War of 1812. A second war between the two countries was formally declared by the United States on June 18, 1812, but the Americans had already captured a large number of British ships and sailors. It is generally spoken of in history as the War of 1812. The vessels of the Americans were superior to those of their opponents and destroyed the maritime supremacy of Great Britain within a year. Two unsuccessful invasions of Canada, in 1812, were followed by a successful invasion under Generals Ripley and Scott in 1814, who captured Chippewa and administered a partial defeat to the British at Lundy's Lane. The British attempted an invasion by way of Lake Champlain, but they were defeated. However, they successfully ascended Chesapeake Bay, defeated the Americans at Bladensburg, and on Aug. 24, 1814, captured Washington. Greater success crowned the Americans in the naval contest, especially on the Great Lakes, where Commodore Perry destroyed a British fleet and captured 63 guns. The war ended by the Treaty of Ghent, signed on Dec. 24, 1814, but the last battle occurred on Jan. 8, 1815, at New Orleans, where General Jackson defeated the British under General Pakenham. That battle was a severe loss to the British and was fought before any information of the peace treaty reached the United States.

Mexican War. The war with Mexico was the next military contest to engage the United States. It was caused partly by the United States annexing Texas in 1845 and partly by a boundary dispute between Mexico and the new territory. Texas had previously been a part or Mexico, but had been organized as an independent republic, and a Mexican army crossed the Rio Grande on April 26, 1845, to maintain Mexican authority. The Mexicans were met by an American army under General Taylor, who displayed much vigor in their pursuit, defeating them at Palo Alto, Monterey, and Saltillo, and finally subduing them at Buena Vista on Feb. 23, 1847. Another army under Scott landed at Vera Cruz, which was captured March 29, 1847, and the American army rapidly pushed forward to Contreras, Churubusco, and the City of Mexico, which was captured on Sept. 14, 1847. The treaty of peace, signed Feb. 2, 1848, made the Rio Grande the boundary, and ceded New Mexico and California to the United States.

Slavery. Early in the history of the country the feeling between the political parties was more or less pronounced, at first between the Federalists and the Anti-Federalists, and later between the former and the more vigorous Democratic party. However, the successful administration of James Madison removed many questions from controversy and gave rise to the *Era of Good Feeling*. Later the rise of the Whig party again divided the people into two great political organizations and forced many issues of commerce, transportation, finance, and internal improvement to the front.

In the meantime the feeling became intense on the question of slavery extension. In the Northern States, where slavery was both unpopular and unprofitable, the sentiment against its extension, and even retention, was decidedly strong, while the Southern States advocated the enlargement of the slave-holding territory with the view of maintaining the balance of political power. Slavery had been introduced as early as 1619, when a Dutch vessel brought the first slaves to the colonies, and the slave trade from African ports was long an important source of revenue. The traffic in slaves had been abolished in the United States in 1808, but the question at issue was whether to maintain slavery in the states where it was already recognized as an institution and to extend it to new territories. The acquisition of California and New Mexico intensified the contest, since the Northern States were pronounced in their opposition to making the new territory a slave-holding region.

Civil War. The Civil War, extending from 1861 to 1865, finally spread like a vast cloud over the land. It may be assigned to various causes. Prominent among them were the extension of slavery, differences in industrial interests, and a lack of intercourse between the people of the North and the South. John Brown's raid on Harper's Ferry in 1859 had already caused great excitement throughout the Union, which was further intensified by local war in Kansas and the election of Abraham Lincoln to the Presidency. Eleven of the Southern States promptly seceded from the Union and established the Confederate States of America (q. v.). Jefferson Davis, of Mississippi, was elected President and Alexander H. Stephens, of Georgia, became Vice President of the new government. The southern authorities immediately prepared for war by seizing valuable stores and blockading Fort Sumter, in Charleston harbor. President Lincoln declared in his inaugural address, March 4, 1861, that the Southern States were afforded no ground for apprehending any invasions of their rights by the election of a Republican administration and took immediate steps to maintain the Union. The first shot of the war was fired against the granite walls of Fort Sumter on April 12, 1861, and two days later the commanding officer, Major Anderson, surrendered to General Beauregard, but he was permitted to sail with his garrison to New York.

The armed contest for the maintenance of the Union is one of the most sanguinary in the history of the world. President Lincoln issued a proclamation on April 15, 1861, calling for 75,000 men for three months. It was the general opinion that the war would be of short duration, but the people of the Southern States responded to the call to arms with characteristic alacrity and fought with remarkable bravery, thus extending the contest about four years. The number of men enrolled in the Union army at different times included 2,775,500, while the army was largest on May 1, 1865, when it consisted of 1,000,516 men. The Confederate troops numbered 692,000. It is estimated that the total number of deaths exceeded 512,000, of which 318,000 belonged to the Federal army. The losses of both Federal and Confederate soldiers in the greatest battles were as follows: Shiloh, 27,000; Chancellorsville, 31,000; Stone River, 37,000; Antietam, 38,000; Gettysburg, 53,000; McClellan's peninsular campaign, 50,000; Sherman's campaign, 125,000; and Grant's peninsular campaign, 180,000. The war closed with the surrender of General Lee at Appomattox, Va., April 9, 1865. On Jan. 1, 1863, President Lincoln issued the emancipation proclamation to free the slaves. Other incidents of interest in the war include the unfriendly spirit shown by England to the success of the Union cause, the loss of hundreds of merchantmen and other vessels, and the construction and successful use of the *Monitor*. The war paralyzed the industries of the Southern States and caused the national debt to reach $2,756,431,571 on Aug. 1, 1865, which was its highest point.

Reconstruction. President Lincoln and Congress anticipated the problems involved in bringing the seceded states back into the Union and establishing responsible and loyal governments in the same. In fact reconstruction began to be discussed as early as 1863, although the period involved in this feature of the Civil War properly extends from the close of the conflict of arms in 1865 until the withdrawal of the Federal troops from the Southern States in 1877. Lincoln having been assassinated, in 1865, the Vice President, Andrew Johnson, became the chief executive. The latter adopted the lenient policy of Lincoln in the issues of reconstruction, but new questions arose and at length estranged him from a majority in Congress. Accordingly he was impeached and subjected to an extended trial before the Senate, where a single vote saved him from conviction. Congress in the meantime proposed the Thirteenth Amendment to the Constitution, abolishing slavery, which was ratified by the requisite number of states in December, 1865. In the same year both houses of Congress proposed the Fourteenth Amendment, which, after much discussion, was ratified in July, 1868. This provides that all persons born or naturalized in the United States, and subject to the jurisdiction thereof, shall be deemed to be citizens of the United States and the State where they reside. Congress finally passed the Tenure of Office Bill, over the veto of the President, as a restriction to limit the chief executive in his power of removal from office. However, the President removed Stanton as Secretary of War and appointed Lorenzo Thomas in his stead, considering that Congress had invaded the constitutional rights of the President. This was the direct cause of the impeachment proceedings. Other features of

the period include the carpetbaggers' (q. v.) government in the South, the Ku Klux Klan (q. v.), and the building of the Pacific railroads. The eleven states which had seceded were readmitted to the Union as follows: Tennessee in 1866; Alabama, Arkansas, Florida, Georgia, Louisiana, North Carolina, and South Carolina in 1868; and Mississippi, Texas, and Virginia in 1870. In 1877, in the administration of President Hayes, the remaining troops were withdrawn from the South.

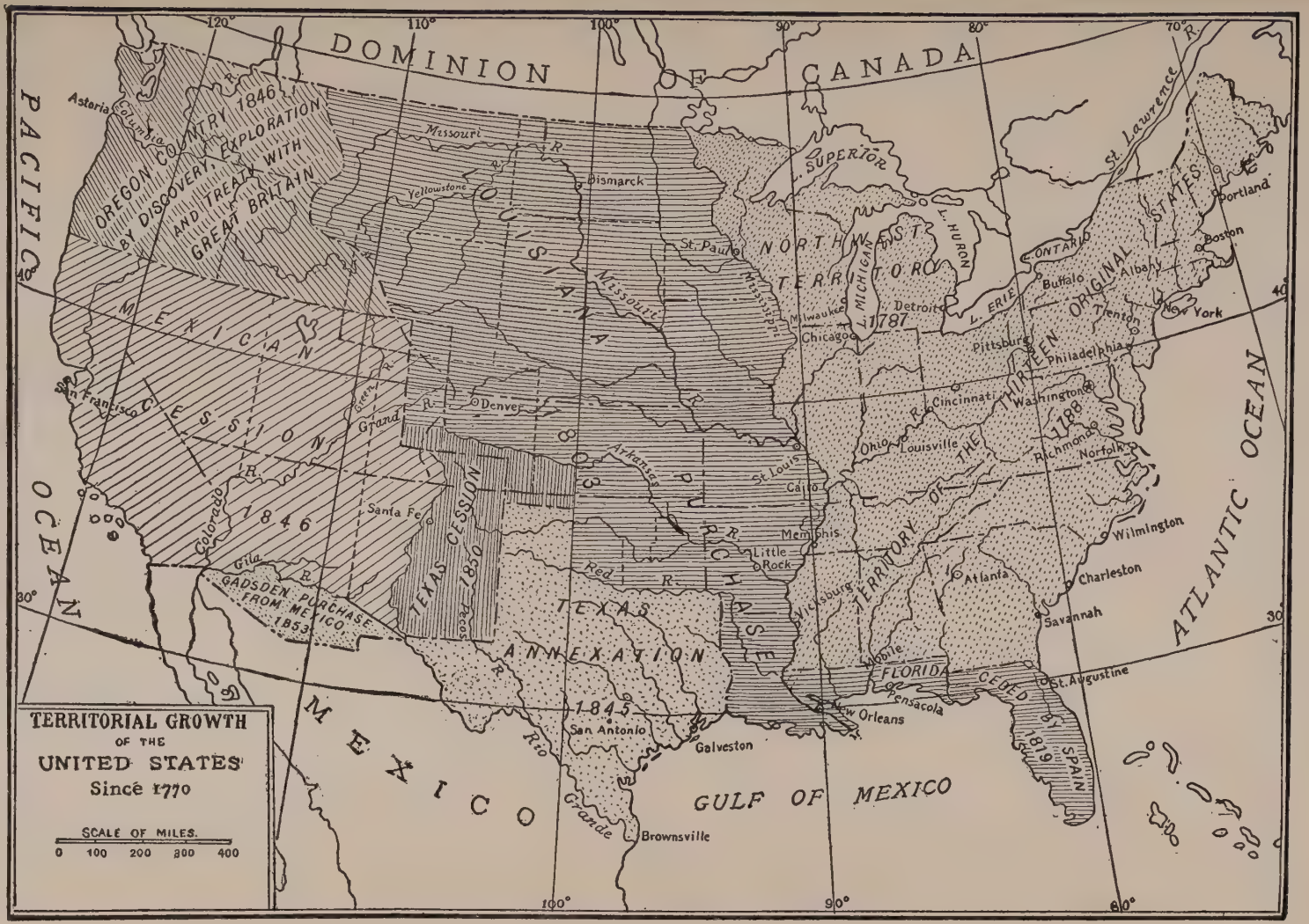
National Development. The subsequent history of the United States records remarkable growth in population and wealth. It is an epoch of development in industries and educational enterprises. Not only were the seceded states reconstructed as members of the Union, but all feeling of sectionalism has passed away. It has witnessed greater commercial and social intercourse between the two sections than were maintained at any other time in the history of the country, which has resulted in welding enduring ties of sympathy and sentiment.

Spanish-American War. No military contest occurred in the period from 1865 until the beginning of the Spanish-American War, in 1898. This war was the outgrowth of Spanish oppression in Cuba and Porto Rico, where a war for independence had been waged for many years. Naturally sympathetic for the people struggling for independence, the Americans were greatly aroused by the destruction of the battleship *Maine* with its crew of 262 men, in Havana harbor, by a torpedo mine, on Feb. 15, 1898. Congress passed a bill on April 25 declaring that a state of war existed between the United States and Spain and that it had so existed since and including April 21.

The first shot of the Spanish-American war was fired on April 22 by the gunboat *Nashville,* which captured the Spanish ship *Buenaventura* off the coast of Florida. It may be said that the short and decisive contest was one of battleships, in which the United States demonstrated remarkable efficiency as a naval power. Commodore Dewey destroyed the Spanish fleet in Manila Bay, in the Philippines, and Commodore Schley located the most powerful fleet of Spain, that under command of Admiral Cervera, in Santiago harbor. The latter was blockaded by the American ships off the harbor entrance, including the *Iowa, New York, Brooklyn, Indiana, Oregon, Texas, Marblehead,* and *New Orleans.* Admiral Cervera made a well-directed effort to escape from the harbor into the open sea, but the Americans under the direct command of Commodore Schley, the commanding officer, Commodore Sampson, being temporarily absent, captured or destroyed every Spanish vessel. Among the battles fought by the army are those under General Lawton at El Caney, Cuba, on July 1, and that of San Juan Hill on the same date under General Wheeler and General Hawkins, the whole expedition being commanded by General Shafter. These battles compelled the capitulation of the Spanish army under General Toral at Santiago, which was surrendered on July 17. Peace was concluded by the Treaty of Paris on Dec. 10, 1898, which ceded Porto Rico and the Philippines to the United States and recognized the right of Cuba to establish an independent government, the United States paying Spain $20,000,000 in consideration of the latter country relinquishing its claims to the Philippines.

Philippine Insurrection. A large party in the Philippines being hostile to American annexation, an independent government was established by the insurgent Filipinos on June 12, 1898, of which Aguinaldo was made president. The Philippine republic was proclaimed three weeks later and a general address was issued, which consisted in part of an appeal to the European powers for official recognition. Hostilities between the American troops under General Otis and the insurgents became active and a desultory guerrilla warfare was inaugurated by the Filipinos. At the close of 1899 the United States had 2,051 officers and 63,483 men in the service against the insurgents. With this force it was possible to clear central Luzón of effective Filipino soldiery and the islands toward the south were occupied with more or less dispatch. Major General Lawton was killed in action in December, 1899, and subsequently severe skirmishes occurred in Luzón and Mindanao. Maj. Gen. Arthur McArthur was made commander in chief of the Philippines in 1900, and on May 5 of that year published an amnesty proclamation to affect those surrendering to the United States authority. However, hostilities of more or less importance continued until March 23, 1901, when Aguinaldo was captured by a detachment of the United States army under Gen. Frederick Funston. It may be said that this capture ended armed opposition in the archipelago. For the political history see the article on Political Parties in the United States.

Territorial Expansion. The territorial growth of the United States has been constant, the nation emerging from all its military contests with signal success. At the time of the peace treaty that concluded the war of independence, in 1783, the territorial expanse was 827,844 square miles. Thomas Jefferson negotiated the Louisiana Purchase in 1803, thus adding 1,171,931 square miles. Florida was purchased of Spain in 1819, the region ceded under this purchase containing 59,368 square miles. With the annexation of Texas, in 1845, 376,133 square miles were added, and the Mexican cession of 1848 increased the national domain by 545,783 square miles. The Gadsden Purchase, a tract of land lying south of the Gila River, was secured from Mexico in 1853 in consideration of $10,000,000. It embraces an area of 45,535 square miles. Alaska, containing 590,884


DOMINION OF CANADA
PACIFIC OCEAN
ATLANTIC OCEAN
MEXICO
GULF OF MEXICO
OREGON COUNTRY 1846
BY DISCOVERY, EXPLORATION AND TREATY WITH GREAT BRITAIN
MEXICAN CESSION 1846
LOUISIANA PURCHASE 1803
TEXAS ANNEXATION 1845
TEXAS CESSION 1850
GADSDEN PURCHASE FROM MEXICO 1853
NORTHWEST TERRITORY
TERRITORY OF THE THIRTEEN ORIGINAL STATES 1788
CEDED BY SPAIN 1819
FLORIDA
1787
Astoria
Columbia R.
Missouri R.
Yellowstone R.
Bismarck
St. Paul
Mississippi R.
Milwaukee
Chicago
Detroit
L. Superior
L. Michigan
L. Huron
L. Erie
Ontario
Buffalo
Albany
Boston
Portland
St. Lawrence R.
New York
Trenton
Philadelphia
Pittsburg
Cincinnati
Washington
Richmond
Norfolk
Ohio R.
Louisville
St. Louis
Cairo
Memphis
Little Rock
Arkansas R.
Red R.
Vicksburg
Natchez
Mobile
New Orleans
Pensacola
St. Augustine
Atlanta
Charleston
Savannah
Wilmington
Galveston
San Antonio
Rio Grande R.
Brownsville
Denver
Grand R.
Green R.
Colorado R.
Gila R.
Santa Fe
San Francisco
120°
110°
100°
90°
80°
70°
40°
30°
TERRITORIAL GROWTH
OF THE
UNITED STATES
Since 1770
SCALE OF MILES.
0 100 200 300 400

square miles, was purchased of Russia in 1867 for $7,200,000.

COLONIES. The chief colonial possessions of the United States are Porto Rico, Hawaii, and the Philippines, all of which are treated in special articles, which see.

Guam, the largest of the Ladrone Islands, was ceded to the United States by the treaty at Paris in 1898. It is located 900 miles from Manila and 5,200 miles from San Francisco. It has an area of 150 square miles. Spanish is the prevailing language. The inhabitants are mostly immigrants from the Philippines, and the rate of illiteracy is placed at ten per cent. Tropical fruits, sugar cane, and rice are the chief products.

Wake Island, a small tract of land lying on the route between Hawaii and Japan, about 2,000 miles from the former and 3,000 miles from the latter, was claimed for the United States by Commander Taussig, of the *Bennington,* in 1899. With it are included a number of small islands of rocky or coral reef formation and the larger part is uninhabited.

Tutuila, one of the Samoan Islands, was ceded to the United States in 1899 in a treaty concluded with Germany and Great Britain. It has an area of 54 square miles and a population of 5,800 inhabitants. Pago-Pago, the chief town, is considered the most valuable island harbor in the entire Pacific ocean. This harbor could hold the entire naval force of the United States. The coaling station, being surrounded by high bluffs, is safe from shells thrown from the outside. Being located on a direct line from San Francisco to Australia and about 2,200 miles from Hawaii, the possession is of value commercially as a station.

In 1904 a tract of land was acquired from the republic of Panama, known as the Panama Canal Zone. This grant was made in perpetuity for the construction and maintenance of the Panama Canal and extends from the Caribbean Sea to the Pacific Ocean. It includes a total of 474 square miles, embracing the small islands in the Bay of Panama, known as Culebra, Flamingo, Nacs, and Perico. The Virgin Islands, formerly known as the Danish West Indies, were purchased of Denmark in 1917 for $25,000,000.

WORLD POWER. The birth of the United States may be said to date from the discovery of Columbus in 1492. Although more than 100 years elapsed from that time until the permanent settlements were established along the coast of the Atlantic, the few scattered settlements soon grew to become thirteen regularly constituted colonies. This is the simple story of the early and primitive communities that have since developed into a nation of forty-six states, several territories, and a group of colonial possessions, constituting at present one of the foremost political and industrial powers of the world. The lofty principles which underlie the government and the notable achievements in the history of the nation are proof that the country has in store still greater achievements for the future. No better display of national intelligence was ever made than that exhibited in the World's Columbian Exposition at Chicago in 1893, the Louisiana Purchase Exposition at Saint Louis, in 1904, and a number of smaller but notable exhibitions of more recent dates. The nation stands among the foremost in wealth, in educational achievements, in commercial enterprise, and in industrial development. These and many other factors, such as the building of the Panama Canal and its attainments in diplomacy, are factors that make the country noted as a world power. See **War.**

UNITED STATES, Constitution of the, the basic or fundamental law of the United States of America. It is the organic law that unites the states and binds them into a perpetual Union. All the laws of the nation and of the several states are subordinate to the Constitution of the United States, and any law made by a legislative body within its jurisdiction must be in accord with the basic law, otherwise it is void and inoperative. The Constitution is preceded by the preamble and consists of seven original articles and nineteen articles of amendment. It was adopted on Sept. 17, 1787, by a constitutional convention held in Independence Hall, Philadelphia, and went into effect on March 4, 1789. The full text is as follows:

CONSTITUTION OF THE UNITED STATES.

We, the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America.

ARTICLE I.

SECTION 1.—All legislative powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

SEC. 2.—The House of Representatives shall be composed of members chosen every second year by the people of the several states, and electors in each State shall have the qualifications requisite for electors of the most numerous branch of the State Legislature.

No person shall be a representative who shall not have attained the age of twenty-five years, and been seven years a citizen of the United States, and who shall not, when elected, be an inhabitant of that state in which he shall be chosen.

Representatives and direct taxes shall be apportioned among the several states which may be included within this Union, according to their respective numbers, which shall be determined by

adding to the whole number of free persons, including those bound to service for a term of years, and excluding Indians not taxed, three-fifths of all other persons. The actual enumeration shall be made within three years after the first meeting of the Congress of the United States, and within every subsequent term of ten years, in such manner as they shall by law direct. The number of representatives shall not exceed one for every thirty thousand; but each State shall have at least one representative; and until such enumeration shall be made, the state of New Hampshire shall be entitled to choose three, Massachusetts, eight, Rhode Island and Providence Plantations, one, Connecticut, five, New York, six, New Jersey, four, Pennsylvania, eight, Delaware, one, Maryland, six, Virginia, ten, North Carolina, five, South Carolina, five, and Georgia, three.

When vacancies happen in the representation from any State, the executive authority thereof shall issue writs of election to fill such vacancies.

The House of Representatives shall choose their speaker and other officers; and shall have the sole power of impeachment.

SEC. 3.—The Senate of the United States shall be composed of two senators from each State, chosen by the Legislature thereof, for six years; and each Senator shall have one vote.

Immediately after they shall be assembled in consequence of the first election, they shall be divided, as equally as may be, into three classes. The seats of the senators of the first class shall be vacated at the expiration of the second year, of the second class, at the expiration of the fourth year, and of the third class, at the expiration of the sixth year, so that one-third may be chosen every second year; and if vacancies happen, by resignation or otherwise, during the recess of the Legislature of any State, the executive thereof may make temporary appointments until the next meeting of the Legislature, which shall then fill such vacancies.

No person shall be a Senator who shall not have attained to the age of thirty years, and been nine years a citizen of the United States, and who shall not, when elected, be an inhabitant of that State for which he shall be chosen.

The Vice President of the United States shall be President of the Senate, but shall have no vote unless they be equally divided.

The Senate shall choose their other officers, and also a president *pro tempore,* in the absence of the Vice President, or when he shall exercise the office as President of the United States.

The Senate shall have the sole power to try all impeachments. When sitting for that purpose, they shall be on oath or affirmation.

When the President of the United States is tried, the Chief Justice shall preside; and no person shall be convicted without the concurrence of two-thirds of the members present.

Judgment, in cases of impeachment, shall not extend further than to removal from office, and disqualification to hold and enjoy any office of honor, trust, or profit under the United States; but the party convicted shall, nevertheless, be liable and subject to indictment, trial, judgment, and punishment, according to law.

SEC. 4.—The times, places, and manner of holding elections for senators and representatives shall be prescribed in each State by the Legislature thereof; but the Congress may, at any time, by law, make or alter such regulations, except as to the places of choosing senators.

The Congress shall assemble at least once in every year; and such meeting shall be on the first Monday in December, unless they shall by law appoint a different day.

SEC. 5.—Each house shall be the judge of the elections, returns, and qualifications of its own members; and a majority of each shall constitute a quorum to do business; but a smaller number may adjourn from day to day, and may be authorized to compel the attendance of absent members, in such manner and under such penalties as each house may provide.

Each house may determine the rules of its proceedings, punish its members for disorderly behavior, and, with the concurrence of two-thirds, expel a member.

Each house shall keep a journal of its proceedings, and from time to time publish the same, excepting such parts as may in their judgment require secrecy; and the yeas and nays of the members of either house, on any question, shall, at the desire of one-fifth of those present, be entered on the journal.

Neither house, during the session of Congress, shall, without the consent of the other, adjourn for more than three days, nor to any other place than that in which the two houses shall be sitting.

SEC. 6.—The senators and representatives shall receive a compensation for their services, to be ascertained by law, and paid out of the treasury of the United States. They shall, in all cases except treason, felony, and breach of the peace, be privileged from arrest during their attendance at the session of their respective houses, and in going to and returning from the same; and, for any speech or debate in either house, they shall not be questioned in any other place.

No Senator or Representative shall, during the time for which he was elected, be appointed to any civil office under the authority of the United States which shall have been created, or the emoluments whereof shall have been increased, during such time; and no person holding any office under the United States shall be a member of either house during his continuance in office.

SEC. 7.—All bills for raising revenue shall originate in the House of Representatives; but the Senate may propose or concur with amendments, as on other bills.

Every bill which shall have passed the House of Representatives and the Senate, shall, before it becomes a law, be presented to the President of the United States; if he approve he shall sign it, but if not he shall return it, with his objections, to that house in which it shall have originated, who shall enter the objections at large on their journal, and proceed to reconsider it. If after such reconsideration, two-thirds of that house shall agree to pass the bill, it shall be sent, together with the objections, to the other house, by which it shall likewise be reconsidered, and, if approved by two-thirds of that house, it shall become a law. But in all such cases, the votes of both houses shall be determined by yeas and nays; and the names of the persons voting for and against the bill shall be entered on the journal of each house respectively. If any bill shall not be returned by the President within ten days (Sundays excepted) after it shall have been presented to him, the same shall be a law in like manner as if he had signed it, unless the Congress by their adjournment prevent its return, in which case it shall not be a law.

Every order, resolution, or vote, to which the concurrence of the Senate and House of Representatives may be necessary (except on a question of adjournment), shall be presented to the President of the United States; and, before the same shall take effect, shall be approved by him, or, being disapproved by him, shall be repassed by two-thirds of the Senate and House of Representatives, according to the rules and limitations prescribed in the case of a bill.

SEC. 8.—The Congress shall have power:—

To lay and collect taxes, duties, imposts, and excises, to pay the debts, and provide for the common defense and general welfare, of the United States; but all duties, imposts, and excises shall be uniform throughout the United States:

To borrow money on the credit of the United States:

To regulate commerce with foreign nations, and among the several states, and with the Indian tribes:

To establish an uniform rule of naturalization, and uniform laws on the subject of bankruptcies throughout the United States:

To coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures:

To provide for the punishment of counterfeiting the securities and current coin of the United States:

To establish post offices and post roads:

To promote the progress of science and useful arts, by securing for limited times, to authors and inventors, the exclusive right to their respective writings and discoveries:

To constitute tribunals inferior to the Supreme Court:

To define and punish piracies and felonies committed on the high seas, and offenses against the law of nations:

To declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water:

To raise and support armies; but no appropriation of money to that use shall be for a longer term than two years:

To provide and maintain a navy:

To make rules for the government and regulation of the land and naval forces:

To provide for calling forth the militia to execute the laws of the Union, suppress insurrections, and repel invasions:

To provide for organizing, arming and disciplining the militia, and for governing such part of them as may be employed in the service of the United States, reserving to the states respectively, the appointment of the officers, and the authority of training the militia according to the discipline prescribed by Congress.

To exercise exclusive legislation, in all cases whatsoever, over such district (not exceeding ten miles square) as may, by cession of particular states, and the acceptance of Congress, become the seat of government of the United States, and to exercise like authority over all places purchased by the consent of the Legislature of the State in which the same shall be, for the erection of forts, magazines, arsenals, dockyards, and other needful buildings:—And

To make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution in the government of the United States, or in any department or office thereof.

SEC. 9.—The migration or importation of such persons as any of the states now existing shall think proper to admit, shall not be prohibited by the Congress prior to the year one thousand eight hundred and eight; but a tax, or duty, may be imposed on such importation, not exceeding ten dollars for each person.

The privilege of the writ of *habeas corpus* shall not be suspended, unless when in cases of rebellion or invasion the public safety may require it.

No bill of attainder or *ex post facto* law shall be passed.

No capitation or other direct tax shall be laid, unless in proportion to the census, or enumeration, hereinbefore directed to be taken.

No tax or duty shall be laid on articles exported from any State. No preference shall be given by any regulation of commerce or revenue to the ports of one State over those of another; nor shall vessels bound to or from one State be obliged to enter, clear, or pay duties, in another.

No money shall be drawn from the treasury but in consequence of appropriations made by law; and a regular statement and account of

the receipts and expenditures of all public money shall be published from time to time.

No title of nobility shall be granted by the United States; and no person holding any office of profit or trust under them shall, without the consent of the Congress, accept of any present, emolument, office or title of any kind whatever, from any king, prince, or foreign state.

SEC. 10.—No state shall enter into any treaty, alliance, or confederation; grant letters of marque and reprisal; coin money; emit bills of credit; make anything but gold and silver coin a tender in payment of debts; pass any bill of attainder, *ex post facto* law, or law impairing the obligations of contracts; or grant any title of nobility.

No State shall, without the consent of the Congress, lay any imposts or duties on imports or exports, except what may be absolutely necessary for executing its inspection laws; and the net produce of all duties and imposts laid by any State on imports or exports, shall be for the use of the treasury of the United States; and all such laws shall be subject to the revision and control of the Congress. No State shall, without the consent of Congress, lay any duty of tonnage, keep troops or ships of war in time of peace, enter into any agreement or compact with another State or with a foreign power, or engage in war, unless actually invaded, or in such imminent danger as will not admit of delay.

ARTICLE II.

SECTION 1.—The executive power shall be vested in a President of the United States of America. He shall hold his office during the term of four years, and together with the Vice President, chosen for the same term, be elected as follows:—

Each State shall appoint, in such manner as the Legislature thereof may direct, a number of electors equal to the whole number of senators and representatives to which the State may be entitled in the Congress; but no Senator or Representative, or person holding an office of trust or profit under the United States, shall be appointed an elector.

The electors shall meet in their respective states, and vote by ballot for two persons, of whom one, at least, shall not be an inhabitant of the same State with themselves. And they shall make a list of all the persons voted for, and of the number of votes for each; which list they shall sign and certify, and transmit sealed to the seat of the government of the United States, directed to the President of the Senate. The President of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates; and the votes shall then be counted. The person having the greatest number of votes shall be the President, if such number be a majority of the whole number of electors appointed; and if there be more than one who have such majority, and have an equal number of votes, then the House of Representatives shall immediately choose, by ballot, one of them for President; and if no person have a majority, then, from the five highest on the list the said house shall, in like manner, choose the President. But, in choosing the President, the votes shall be taken by states; the representation from each State having one vote; a quorum for this purpose shall consist of a member or members from two-thirds of the states; and a majority of all the states shall be necessary to a choice. In every case, after the choice of the President, the person having the greatest number of votes of the electors shall be the Vice President. But if there should remain two or more who have equal votes, the Senate shall choose from them, by ballot, the Vice President. (This clause has been superseded by Amendment XII.)

The Congress may determine the time of choosing the electors, and the day on which they shall give their votes; which day shall be the same throughout the United States.

No person, except a natural born citizen, or a citizen of the United States at the time of the adoption of this Constitution, shall be eligible to the office of President; neither shall any person be eligible to that office who shall not have attained to the age of thirty-five years, and been fourteen years a resident within the United States.

In case of the removal of the President from office, or of his death, resignation, or inability to discharge the powers and duties of the said office, the same shall devolve on the Vice President; and the Congress may, by law, provide for the case of removal, death, resignation, or inability, both of the President and Vice President, declaring what officer shall then act as President; and such officer shall act accordingly, until the disability be removed, or a President shall be elected.

The President shall, at stated times, receive for his services a compensation, which shall neither be increased nor diminished during the period for which he shall have been elected; and he shall not receive within that period any other emolument from the United States, or any of them.

Before he enter on the execution of his office, he shall take the following oath or affirmation:

"I do solemnly swear (or affirm) that I will faithfully execute the office of President of the United States and will, to the best of my ability, preserve, protect, and defend the Constitution of the United States."

SEC. 2.—The President shall be commander in chief of the army and navy of the United States, and of the militia of the several states, when called into the actual service of the United States; he may require the opinion, in writing, of the principal officer in each of the executive de-

partments, upon any subject relating to the duties of their respective offices, and he shall have power to grant reprieves and pardons for offenses against the United States, except in cases of impeachment.

He shall have power, by and with the advice and consent of the Senate, to make treaties, provided two-thirds of the Senators present concur; and he shall nominate, and by and with the advice and consent of the Senate, shall appoint, ambassadors, other public ministers, and consuls, judges of the Supreme Court, and all other officers of the United States, whose appointments are not herein otherwise provided for, and which shall be established by law; but the Congress may, by law, vest the appointment of such inferior officers as they think proper, in the President alone, in the courts of law, or in the heads of departments.

The President shall have power to fill up all vacancies that may happen during the recess of the Senate, by granting commissions, which shall expire at the end of their next session.

SEC. 3.—He shall, from time to time, give to the Congress information of the state of the Union, and recommend to their consideration such measures as he shall judge necessary and expedient; he may, on extraordinary occasions, convene both houses, or either of them, and, in case of disagreement between them with respect to the time of adjournment, he may adjourn them to such time as he shall think proper; he shall receive ambassadors and other public ministers; he shall take care that the laws be faithfully executed; and shall commission all the officers of the United States.

SEC. 4.—The President, Vice President, and all civil officers of the United States, shall be removed from office on impeachment for and conviction of treason, bribery, or other high crimes and misdemeanors.

ARTICLE III.

SECTION 1.—The judicial power of the United States shall be vested in a Supreme Court, and in such inferior courts as the Congress may from time to time ordain and establish. The judges, both of the supreme and inferior courts, shall hold their offices during good behavior; and shall, at stated times, receive for their services a compensation, which shall not be diminished during their continuance in office.

SEC. 2.—The judicial power shall extend to all cases, in law and equity, arising under this Constitution, the laws of the United States and treaties made, or which shall be made, under their authority; to all cases affecting ambassadors, other public ministers, and consuls; to all cases of admiralty and maritime jurisdiction; to controversies to which the United States shall be a party; to controversies between two or more states, between a State and citizens of another State, between citizens of different states, between citizens of the same State claiming lands under grants of different states, and between a State, or the citizens thereof, and foreign states, citizens, or subjects.

In all cases affecting ambassadors, other public ministers and consuls, and those in which a State shall be a party, the Supreme Court shall have original jurisdiction. In all the other cases before mentioned, the Supreme Court shall have appellate jurisdiction both as to law and fact, with such exceptions, and under such regulations as the Congress shall make.

The trial of all crimes, except in cases of impeachment, shall be by jury; and such trial shall be held in the State where the said crimes shall have been committed; but, when not committed within any State, the trial shall be at such place or places as the Congress may by law have directed.

SEC. 3.—Treason against the United States shall consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort. No persons shall be convicted of treason unless on the testimony of two witnesses to the same overt act, or on confession in open court.

The Congress shall have power to declare the punishment of treason, but no attainder of treason shall work corruption of blood or forfeiture, except during the life of the person attainted.

ARTICLE IV.

SECTION 1.—Full faith and credit shall be given in each State to the public acts, records, and judicial proceedings of every other State. And the Congress may by general laws prescribe the manner in which such acts, records, and proceedings shall be proved, and the effect thereof.

SEC. 2.—The citizens of each State shall be entitled to all privileges and immunities of citizens in the several states.

A person charged in any State with treason, felony, or other crime, who shall flee from justice, and be found in another State, shall, on demand of the executive authority of the State from which he fled, be delivered up, to be removed to the State having jurisdiction of the crime.

No person held to service or labor in one State under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up on claim of the party to whom such service or labor may be due.

SEC. 3.—New states may be admitted by the Congress into this Union; but no new State shall be formed or erected within the jurisdiction of any other State; nor any State be formed by the junction of two or more states, or parts of states, without the consent of the Legislature of the State concerned, as well as of the Congress.

The Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States; and nothing in this Constitution shall be so construed as to prejudice any claims of the United States, or of any particular State.

SEC. 4.—The United States shall guarantee to every State in this Union a republican form of government, and shall protect each of them against invasion; and on application of the Legislature, or of the executive (when the Legislature cannot be convened), against domestic violence.

ARTICLE V.

The Congress, whenever two-thirds of both houses shall deem it necessary, shall propose amendments to this Constitution: or, on the application of the legislatures of two-thirds of the several states, shall call a convention for proposing amendments, which, in either case, shall be valid to all intents and purposes, as part of this Constitution, when ratified by the legislatures of three-fourths of the several states, or by conventions in three-fourths thereof, as the one or the other mode of ratification may be proposed by the Congress; provided, that no amendment which may be made prior to the year one thousand eight hundred and eight shall in any manner affect the first and fourth clauses in the ninth section of the first article; and that no State, without its consent, shall be deprived of its equal suffrage in the Senate.

ARTICLE VI.

All debts contracted, and engagements entered into, before the adoption of this Constitution, shall be as valid against the United States under this Constitution, as under the confederation.

This Constitution, and the laws of the United States which shall be made in pursuance thereof; and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land; and the judges in every State shall be bound thereby, anything in the constitution or laws of any State to the contrary notwithstanding.

The senators and representatives before mentioned, and the members of the several State legislatures, and all executive and judicial officers, both of the United States and of the several states, shall be bound by oath or affirmation to support this Constitution; but no religious test shall ever be required as a qualification to any office or public trust under the United States.

ARTICLE VII.

The ratification of the conventions of nine states shall be sufficient for the establishment of this Constitution between the states so ratifying the same.

Done in convention by the unanimous consent of the states present, the seventeenth day of September, in the year of our Lord one thousand seven hundred and eigthy-seven, and of the independence of the United States of America the twelfth. In witness whereof we have hereunto subscribed our names.

GEORGE WASHINGTON, *President, and Deputy from Virginia.*

NEW HAMPSHIRE.—John Langdon, Nicholas Gilman.

MASSACHUSETTS.—Nathaniel Gorham, Rufus King.

CONNECTICUT.—William Samuel Johnson, Roger Sherman.

NEW YORK.—Alexander Hamilton.

NEW JERSEY.—William Livingston, David Bearley, William Patterson, Jonathan Dayton.

PENNSYLVANIA.—Benjamin Franklin, Thomas Mifflin, Robert Morris, George Clymer, Thomas Fitzsimons, Jared Ingersoll, James Wilson, Gouverneur Morris.

DELAWARE.—George Read, Gunning Bedford, Jr., John Dickinson, Richard Bassett, Jacob Broom.

MARYLAND.—James McHenry, Daniel of St. Thomas Jenifer, Daniel Carroll.

VIRGINIA.—John Blair, James Madison, Jr.

NORTH CAROLINA.—William Blount, Richard Dobbs Spaight, Hugh Williamson.

SOUTH CAROLINA.—John Rutledge, Charles Cotesworth Pinckney, Charles Pinckney, Pierce Butler.

GEORGIA.—William Few, Abraham Baldwin.

Attest: WILLIAM JACKSON, *Secretary.*

AMENDMENTS TO THE CONSTITUTION.

ARTICLE I.

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech or of the press; or the right of the people peaceably to assemble, and to petition the government for a redress of grievances.

ARTICLE II.

A well-regulated militia being necessary to the security of a free State, the right of the people to keep and bear arms shall not be infringed.

ARTICLE III.

No soldier shall, in time of peace, be quartered in any house without the consent of the owner; nor in time of war, but in a manner to be prescribed by law.

ARTICLE IV.

The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated; and no warrants shall issue but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the person or things to be seized.

ARTICLE V.

No person shall be held to answer for a capital or otherwise infamous crime, unless on a presentment or indictment of a grand jury, except in cases arising in the land or naval forces, or in the militia when in actual service in time of war or public danger; nor shall any person be subject, for the same offense, to be twice put in jeopardy of life or limb; nor shall be compelled, in any criminal case, to be a witness against himself; nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use without just compensation.

ARTICLE VI.

In all criminal prosecutions the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the State and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor; and to have the assistance of counsel for his defense.

ARTICLE VII.

In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved; and no fact tried by a jury shall be otherwise reëxamined in any court of the United States than according to the rules of the common law.

ARTICLE VIII.

Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.

ARTICLE IX.

The enumeration in the Constitution of certain rights, shall not be construed to deny or disparage others retained by the people.

ARTICLE X.

The powers not delegated to the United States by the Constitution, nor prohibited by it to the states, are reserved to the states respectively, or to the people.

ARTICLE XI.

The judicial power of the United States shall not be construed to extend to any suit in law or equity, commenced or prosecuted against one of the United States, by citizens of another State, or by citizens or subjects of any foreign state.

ARTICLE XII.

The electors shall meet in their respective states, and vote by ballot for President and Vice President, one of whom, at least, shall not be an inhabitant of the same State with themselves; they shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice President; and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice President, and of the number of votes for each, which lists they shall sign and certify, and transmit sealed to the seat of the government of the United States, directed to the president of the Senate; the president of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted; the person having the greatest number of votes for President shall be the President, if such number be a majority of the whole number of electors appointed; and if no person have such majority, then from the persons having the highest numbers, not exceeding three on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President. But, in choosing the President, the votes shall be taken by states, the representation from each State having one vote; a quorum for this purpose shall consist of a member or members from two-thirds of the states, and a majority of all the states shall be necessary to a choice. And if the House of Representatives shall not choose a President, whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the Vice President shall act as President, as in the case of death or other constitutional disability of the President.

The person having the greatest number of votes as Vice President, shall be the Vice President, if such number be a majority of the whole number of electors appointed: and if no person have a majority, then from the two highest numbers on the list, the Senate shall choose the Vice President; a quorum for the purpose shall consist of two-thirds of the whole number of senators, and a majority of the whole number shall be necessary to a choice.

But no person constitutionally ineligible to the office of President, shall be eligible to that of Vice President of the United States.

ARTICLE XIII.

SECTION 1.—Neither slavery nor involuntary servitude, except as a punishment for crime, whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction.

SEC. 2.—Congress shall have power to enforce this article by appropriate legislation.

ARTICLE XIV.

SECTION 1.—All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State de-

prive any person of life, liberty, or property, without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws.

SEC. 2.—Representatives shall be apportioned among the several states, according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for choice of electors for President and Vice President of the United States, representatives in Congress, the executive and judicial officers of a State, or the members of the Legislature thereof, is denied to any of the male inhabitants of such State being twenty-one years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State.

SEC. 3.—No person shall be a Senator, or Representative in Congress, or elector of President and Vice President, or hold any office, civil or military, under the United States, or under any State, who, having previously taken an oath as a member of Congress, or as an officer of the United States, or as a member of any State Legislature, or as an executive or judicial officer of any State, to support the Constitution of the the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof; but Congress may, by a vote of two-thirds of each house, remove such disability.

SEC. 4.—The validity of the public debt of the United States authorized by law, including debts incurred for payment of pensions, and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States, nor any State, shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations, and claims shall be held illegal and void.

ARTICLE XV.

SECTION 1.—The right of citizens of the United States to vote shall not be denied or abridged by the United States, or by any State, on account of race, color, or previous condition of servitude.

ARTICLES XVI, XVII, XVIII, AND XIX.

Article XVI empowers Congress to lay and collect taxes on incomes; Article XVII requires Senators to be elected by the votes of each State; Article XVIII prohibits the manufacture and sale of intoxicating liquors; and Article XIX grants the right of suffrage without regard to sex.

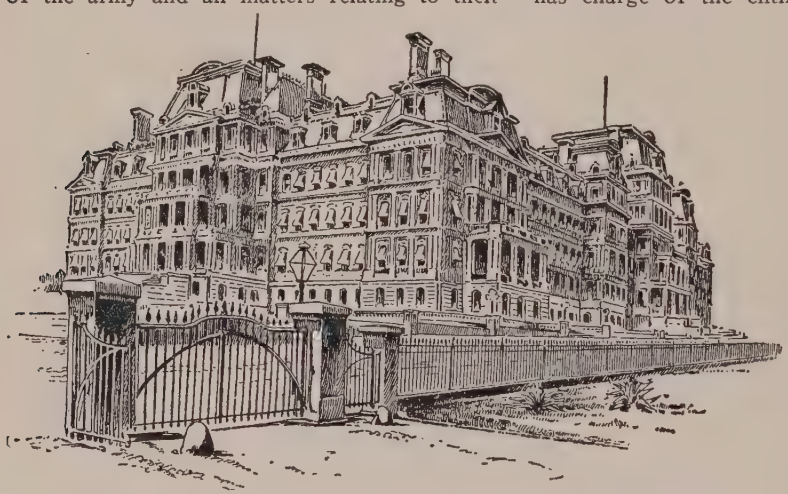
UNITED STATES, Departments of, the executive departments of the Union, whose chief officers comprise the Cabinet of the President. Although executive departments had been established before the adoption of the Constitution, these departments did not constitute an advisory board holding the dignity of the present presidential Cabinet. A Postmaster-General had been provided in 1775 and the four executive departments of Finance, Marine, War, and Foreign Affairs were organized in 1781. Three of the present departments, those of State, War, and the Treasury, were established by the act of Aug. 7, 1789, and the other six were organized subsequently. The Post Office Department was established in 1792, the Department of the Navy in 1798, of the Interior in 1849, of Justice in 1870, of Agriculture in 1889, and of Commerce and Labor in 1903. The head of each department is appointed by the President, subject to confirmation by the Senate, and receives a salary of $12,000 per annum. Besides supervising the important work relative to the respective departments, the cabinet officers may be required to give their opinion in writing to the President on any subject relating to the duties of their respective offices. All the departments have offices in fine, large buildings erected by the government at Washington, D. C.

DEPARTMENT OF THE TREASURY. The Treasury Department may be regarded one of the most important, since the Secretary of the Treasury is charged with the duty of preparing plans for the management and improvement of the revenue. It has charge and control, not only of all the fiscal affairs of the government, but has direct supervision of the national banks, of the customs and internal revenue systems, of the currency and coinage, and of the commercial marine. Other duties imposed upon the department include the inspection of steam vessels and of the marine hospitals, supervision of the life-saving systems, and superintendence of printing and engraving. About 5,000 clerks and officers are employed by the department. Alexander Hamilton was the first Secretary of the Treasury, serving in that capacity from 1789 until 1795.

DEPARTMENT OF STATE. The Department of State is under the supervision of the Secretary of State. His duties are not clearly defined by law, but depend to a considerable extent upon instructions of the President. He is the medium of communication between the United States and the several states and between the nation and foreign countries. In his custody are copies of all public documents, treaties, laws, and official correspondence with foreign countries. He is the custodian of the great seal of the United States, which he affixes to all national documents requiring it, and countersigns all commissions issued by the President. The ambassadors and consuls are under the direction of this department. Citizens desiring to visit or travel in foreign countries receive passports from the Secretary of State. He presents foreign ministers to the President and authenticates all proclamations issued by the chief executive.

Thomas Jefferson served as Secretary of State from 1789 to 1794, being the first to fill that position.

Department of War. The Department of War is presided over by the Secretary of War, who has superintendence of all matters relating to war or to the army, including the purchase and distribution of supplies and army transportation. He has charge of the disbursement of river and harbor appropriations and of the signal service and meteorological records. A large number of subordinate officers assist the head of the department, chief among which are the adjutant general, inspector general, paymaster general, quartermaster general, surgeon general, commissary general, chief of engineers, chief of ordnance, chief signal officer, and chief judge-advocate general. The Secretary of War and his subordinates have custody of the various records appertaining to their duties. He is required to report to the President on the state of the army and all matters relating to their



BUILDING OCCUPIED BY THE STATE, NAVY, AND WAR DEPARTMENTS.

duties. The President is head of the army in the same sense that he is head of the nation, though he does not take command in person in case of war, yet he has the power were he so disposed. It is probably a wise plan to have the control and general operations of the army under the President, since these duties are of an executive character. The President being charged with them, he is able to act on a plan of unity and promptness in maintaining peace at home and in resisting foreign aggr ssion. In 1789 Henry Knox became the first Secretary of War, serving until 1795.

Post Office Department. The Post Office Department was the first to be organized, after the first three originally established, but it was not raised to the dignity of a cabinet position until in 1829. The Postmaster-General is at its head. He is aided by four assistant postmasters-general, each having a specified line of duties. Benjamin Franklin was made Postmaster-General by the second Continental Congress, serving as superintendent of the mails during the American struggle for independence. It is due largely to his studious efforts that the mail service was placed on an efficient basis in the early republic. As now organized, the *first assistant* postmaster-general supervises the money-order system, the free-delivery system, the establishment of new post offices, and the dead-letter office, an office maintained to receive certain classes of unclaimed mail matters. The *second assistant* supervises the purchase of supplies, arranges the mail service, and directs matters relating to contracts. Postage stamps, wrappers, postal cards, and other supplies, and the general financial matters are under the direction of the *third assistant.* Appointments for fourth-class post offices are made by the *fourth assistant,* who in addition has charge of post office inspectors and issues commissions to postmasters. This department has charge of the entire mail service of the nation, including that of the territories and the colonies. Samuel Osgood served as Postmaster-General from 1789 to 1791, but Timothy Pickering was the first to be appointed to that office after the department was regularly established, holding the position from 1791 until 1795. William T. Barry was the first Postmaster-General to have a place in the Cabinet. He held the position from 1829 to 1835.

Department of the Navy. The Department of the Navy is under the management of the Secretary of the Navy. It has charge of the vessels, guns, navy yards, and all other matters pertaining to the navy. Eight bureaus are maintained in the Navy Department. They are the bureaus of navigation, ordnance, yards and docks, medicine and surgery, provisions and clothing, steam engineering, and equipment and recruiting. The department is further assisted by the commandant of the marine corps and by the judge-advocate general. It prepares nautical charts with sailing directions and publishes the *Nautical Almanac,* a work of much value to seamen. George Cabot was the first Secretary of the Navy, holding the office in 1798.

Department of the Interior. The Department of the Interior is directed by the Secretary of the Interior, who has charge of patents and copyrights, public documents, Indian affairs, pensions, mines and mining, and public lands. He

has supervision of the national census, which is taken every ten years, beginning in 1790. Other duties pertain to the public-land surveys, to railroads subsidized by the Federal government, to the management of affairs in the territories, and to the superintendence of certain charitable institutions of the District of Columbia. The commissioners of education, of Indian affairs, of pensions, of patents, and of public lands are subordinate officers of this department. Thomas Ewing served as the first Secretary of the Interior, holding the office from 1849 to 1850.

Department of Justice. The Department of Justice was created in 1789, but was not organized as a cabinet position until 1870. This cabinet office is under the direction of the Attorney-General, who is charged with the general superintendence of the attorneys and marshals of all the Federal courts in the states and territories. It is quite important that such a department be maintained, since through it general uniformity is secured in the trial and prosecution of cases. The Attorney-General examines the title of lands proposed to be purchased by the government for the erection of custom-houses, forts, post offices, and other public institutions. Four assistant attorneys-general are employed. The Attorney-General rarely argues cases, this being done by subordinates, and he may employ counsel to aid district attorneys. Besides making an annual report to Congress, the Attorney-General is charged with the duty of giving opinions and rendering legal services to the heads of the departments and the President. Amos T. Ackerman held the office of Attorney-General from 1870 to 1871, being the first to hold the position as a cabinet officer.

Department of Agriculture. The Department of Agriculture was established in 1862, but the secretaryship was not made a cabinet position until 1889. It is presided over by the Secretary of Agriculture, whose duty is to obtain and disseminate useful information regarding agriculture to the classes interested in that industry, and to distribute among them seeds of new and useful plants. The department collects and publishes statistics in relation to agricultural products and domestic animals, investigates diseases among animals, observes the influence of climatic conditions upon plants and animals, and disseminates knowledge as to the diseases and insects affecting crops and live stock. Norman J. Coleman was Commissioner of Agriculture in 1889, when the office was made a cabinet position, but was succeeded in the same year by Jeremiah M. Rusk.

Departments of Commerce and Labor. See **Commerce and Labor, Departments of.**

UNITED STATES, Independence of the, the freedom from dependence upon other nations that the Union has acquired. It dates from July 4, 1776, when the thirteen colonies adopted the following

DECLARATION OF INDEPENDENCE:

When in the course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume among the powers of the earth, the separate and equal station to which the laws of nature and of Nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation.

We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain inalienable rights, that among these are life, liberty and the pursuit of happiness. That to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed. That whenever any form of government becomes destructive of these ends, it is the right of the people to alter or abolish it, and to institute new government, laying its foundation on such principles and organizing its powers in such form, as to them shall seem most likely to effect their safety and happiness. Prudence, indeed, will dictate that governments long established should not be changed for light and transient causes; and accordingly all experience hath shown, that mankind are more disposed to suffer, while evils are sufferable, than to right themselves by abolishing the forms to which they are accustomed. But when a long train of abuses and usurpations, pursuing invariably the same object, evinces a design to reduce them under absolute despotism, it is their right, it is their duty, to throw off such government, and to provide new guards for their future security. —Such has been the patient sufferance of these colonies; and such is now the necessity which constrains them to alter their former systems of government. The history of the present King of Great Britain is a history of repeated injuries and usurpations, all having in direct object the establishment of an absolute tyranny over these states. To prove this, let facts be submitted to a candid world.

He has refused his assent to laws, the most wholesome and necessary for the public good.

He has forbidden his governors to pass laws of immediate and pressing importance, unless suspended in their operation till his assent should be obtained; and when so suspended, he has utterly neglected to attend to them.

He has refused to pass other laws for the accommodation of large districts of people, unless those people would relinquish the right of representation in the legislature, a right inestimable to them and formidable to tyrants only.

He has called together legislative bodies at places unusual, uncomfortable, and distant from the depository of their public records, for the sole purpose of fatiguing them into compliance with his measures.

He has dissolved representative houses re-

peatedly, for opposing with manly firmness his invasions on the rights of the people.

He has refused for a long time, after such dissolutions, to cause others to be elected; whereby the legislative powers, incapable of annihilation, have returned to the people at large for their exercise; the state remaining in the mean time exposed to all the dangers of invasion from without, and convulsions within.

He has endeavored to prevent the population of these states; for that purpose obstructing the laws for naturalization of foreigners; refusing to pass others to encourage their migration hither, and raising the conditions of new appropriations of lands.

He has obstructed the administration of justice, by refusing his assent to laws for establishing judiciary powers.

He has made judges dependent on his will alone, for the tenure of their offices, and the amount and payment of their salaries.

He has erected a multitude of new offices, and sent hither swarms of officers to harass our people, and eat out their substance.

He has kept among us, in times of peace, standing armies without the consent of our legislature.

He has affected to render the military independent of, and superior to, the civil power.

He has combined with others to subject us to a jurisdiction foreign to our constitution, and unacknowledged by our laws; giving his assent to their acts of pretended legislation:

For quartering large bodies of armed troops among us:

For protecting them, by a mock trial, from punishment for any murders which they should commit on the inhabitants of these states:

For cutting off our trade with all parts of the world:

For imposing taxes on us without our consent:

For depriving us, in many cases, of the benefits of trial by jury:

For transporting us beyond seas to be tried for pretended offences:

For abolishing the free system of English laws in a neighboring province, establishing therein an arbitrary government, and enlarging its boundaries so as to render it at once an example and fit instrument for introducing the same absolute rule into these colonies:

For taking away our charters, abolishing our most valuable laws, and altering fundamentally the forms of our governments:

For suspending our own legislatures, and declaring themselves invested with power to legislate for us in all cases whatsoever.

He has abdicated government here, by declaring us out of his protection and waging war against us.

He has plundered our seas, ravaged our coasts, burnt our towns, and destroyed the lives of our people.

He is at this time transporting large armies of foreign mercenaries to complete the works of death, desolation and tyranny, already begun with circumstances of cruelty and perfidy scarcely paralleled in the most barbarous ages, and totally unworthy the head of a civilized nation.

He has constrained our fellow citizens taken captive on the high seas to bear arms against their country, to become the executioners of their friends and brethren, or to fall themselves by their hands.

He has excited domestic insurrections amongst us, and has endeavored to bring on the inhabitants of our frontiers the merciless Indian savages, whose known rule of warfare is an undistinguished destruction of all ages, sexes, and conditions.

In every stage of these oppressions we have petitioned for redress in the most humble terms. Our repeated petitions have been answered only by repeated injury. A prince, whose character is thus marked by every act which may define a tyrant, is unfit to be the ruler of a free people.

Nor have we been wanting in attention to our British brethren. We have warned them from time to time of attempts by their legislature to extend an unwarrantable jurisdiction over us. We have reminded them of the circumstances of our emigration and settlement here. We have appealed to their native justice and magnanimity, and we have conjured them by the ties of our common kindred to disavow these usurpations, which would inevitably interrupt our connections and correspondence. They too have been deaf to the voice of justice and of consanguinity. We must, therefore, acquiesce in the necessity which denounces our separation, and hold them, as we hold the rest of mankind, enemies in war, in peace friends.

We, therefore, the representatives of the United States of America, in general congress assembled, appealing to the Supreme Judge of the world for the rectitude of our intentions, do, in the name, and by authority of the good people of these colonies, solemnly publish and declare, That these united colonies are, and of right ought to be free and independent states; that they are absolved from all allegiance to the British crown, and that all political connection between them and the state of Great Britain, is and ought to be totally dissolved; and that as free and independent states, they have full power to levy war, conclude peace, contract alliances, establish commerce, and to do all other acts and things which independent states may of right do. And for the support of this declaration, with a firm reliance on the protection of Divine Providence, we mutually pledge to each other our lives, our fortunes, and our sacred honor.

JOHN HANCOCK.

CONNECTICUT.
Roger Sherman,
Samuel Huntington,
William Williams,
Oliver Wolcott.

DELAWARE.
Caesar Rodney,
Geo. Read,
Tho. M'Kean.

GEORGIA.
Button Gwinnett,
Lyman Hall,
Geo. Walton.

MARYLAND.
Samuel Chase,
Wm. Paca,
Thos. Stone,
Charles Carroll, of Carrollton.

MASSACHUSETTS BAY.
Samuel Adams,
John Adams,
Robt. Treat Paine,
Elbridge Gerry.

NEW HAMPSHIRE.
Josiah Bartlett,
William Whipple,
Matthew Thornton.

NEW JERSEY.
Richd. Stockton,
Jno. Witherspoon,
Francis Hopkinson,
John Hart,
Abraham Clark.

NEW YORK.
Wm. Floyd,
Philip Livingston,
Francis Lewis,
Lewis Morris.

NORTH CAROLINA.
William Hooper,
Joseph Hewes,
John Penn.

PENNSYLVANIA.
Robt. Morris,
Benjamin Rush,
Benjamin Franklin,
John Morton,
Geo. Clymer,
Jas. Smith,
Geo. Taylor,
James Wilson,
Geo. Ross.

RHODE ISLAND.
Stephen Hopkins,
William Ellery.

SOUTH CAROLINA.
Edward Rutledge,
Thos. Hayward, Jr.,
Thomas Lynch, Jr.,
Arthur Middleton.

VIRGINIA.
George Wythe,
Richard Henry Lee,
Thomas Jefferson,
Benjamin Harrison,
Thos. Nelson, Jr.
Francis Lightfoot Lee,
Carter Braxton.

UNITED STATES INDIAN TRAINING AND INDUSTRIAL SCHOOL, an institution at Carlisle, Pa., founded in 1879 by the government of the United States. This educational institution is designed to lead the Indian youth to more fully understand and better appreciate the trend of modern civilization, by offering training in the civil arts and in educational courses. While the boys and girls are pursuing study in the common school branches, they are trained in the manual trades and in domestic economy, and under a system of *outing* they are at opportune times placed as servants in the homes of white people. Both in school and while serving practically in the home, they practice the arts of the whites, thus developing the traits and customs of the Caucasian. Practically all the races of Indians found in Alaska and the United States have been represented in this institution, which has given training to more than 5,000 different students. The graduates, of which there are about 425, have engaged largely in the material industries and many have found employment under the government, either as teachers or in the public service. The attendance is about 1,400 students.

UNITED STATES MILITARY ACADEMY, the national institution of the United States for the education of officers for the army, located at West Point, N. Y. The necessity for a military academy for the technical training of officers became manifest in an early period of the Revolution. A plan for such a school was proposed by Gen. Henry Knox in 1776 and was elaborated by Alexander Hamilton. Its establishment was frequently recommended by Washington. The last letter written by him declares this to be "an object of primary importance to this country."

The United States Military Academy was organized under an act of Congress in 1802. Its first superintendent was Col. Jonathan Williams, a grand-nephew of Benjamin Franklin. Col. Sylvanus Thayer, whose statue at West Point bears the legend "The Father of the Military Academy," was superintendent from 1817 to 1833. The curriculum, military and academic, was adopted under his leadership. The traditions of Thayer were carried on and improved, under the supervision of Gen. James G. Totten, inspector of the institution from 1838 to 1864, by a succession of able superintendents. For 47 years one policy prevailed and the type of West Point education was fixed. The experience in the wars of 1846, 1861, and 1898 introduced modifications of details, leaving the early traditions substantially unchanged.

The first object of the institution is to form character. Habits of faithfulness, obedience, and attention to first duty, last and all the time, are inculcated throughout the entire course of four years. At the end of this period the cadet receives a commission as lieutenant in the army. The discipline is strict. A system of daily "marks" enables each cadet to judge his own conduct and to bring himself up to the required standard. By this method habit becomes a second nature. The officer carries into the service qualities that have been inculcated continuously. All delinquencies are noted and punished, and the habit of punctuality is thus established. This is true likewise with other habits. The large number of instructors, all of whom are officers of the army, enables the proficiency of all cadets in every subject to be tested daily. Competence as well as satisfactory conduct is insisted upon in the daily routine. A high standard of personal honor and truthfulness is maintained. The record of the disbursing officers of the army for scrupulous honesty has never been equalled by any other organization.

The curriculum comprises courses in mathematics, English, French, Spanish, physics, chemistry, minerology, geology, electricity, history, military, constitutional and international law, civil and military engineering, tactics, topography, building construction, ordnance and gunnery, fortifications, the art of war, and military history. The corps of cadets comprises 522 persons, who are appointed by the President of the United States. One cadet is appointed from each congressional district (on the recommendation of its Representative), one from each Territory, one from the District of Columbia, one from Porto Rico, two from each state at large (on the recommendation of its senators), and forty from the United States at large. The total number of graduates is about 4,850.

It is worthy of note that the graduates are successful in civil as well as in military pur-

suits. They have given to the country 1 President, 4 cabinet officers, 1 ambassador, 14 ministers to foreign courts, 26 United States senators or representatives, 16 governors of states or territories, 46 presidents of colleges, 136 professors and teachers, 87 presidents of railroad or other corporations, 63 chief engineers, 228 civil engineers, 179 authors, etc., etc. In 1902 President Roosevelt said "No other educational institution in the land has contributed so many names as West Point to the honor roll of the nation's greatest citizens."

UNIVERSALISTS (ū-nĭ-vẽr'sạl-ĭsts), a religious sect which holds to the doctrine that all men will be saved, that even the fallen angels will be forgiven and enjoy eternal life. Those who support this faith hold to the view that salvation is universal and that the Scriptures declare it to be the purpose of God to reveal His grace as extensively as sin is or can be, hence all souls are to be reconciled to God that He may be all in all. The doctrine stands in direct opposition to the dogma of eternal punishment. Universalism, as a specific faith, was founded about 1750, but many members of other sects hold the view that universal bliss is in store for mankind. That man is not a fallen creature, sunk in total depravity, but a being created in the spiritual image of God, is the central element of Universalism. It teaches that salvation is a redemption from sin itself, but not a redemption from the consequences of sin. The chief duty of man is held to be the creating and upbuilding of character, in which he is assisted by a contemplation of the ideals of life as represented by Jesus Christ. In 1922, Canada had about 2,000 Universalists. In the United States they have 765 ministers, 798 churches, and a membership of 60,675. Their church property is valued at $10,800,000. They maintain a Young People's Christian Union, which has 480 societies. The *Christian Leader*, Boston, and *The Universalist*, Chicago, are the leading periodicals.

UNIVERSAL LANGUAGE. See **Esperanto; Volapük.**

UNIVERSE (ū'nĭ-vẽrs), the grand and total aggregate of created things, or all the created things viewed as constituting one system. Anciently the earth was supposed to be the center of the universe and it was thought that all the heavenly bodies revolve about it. The invention of the telescope and the discovery of the law of gravitation revolutionized this theory to the extent that the sun was made the center of the universe, but it was supposed that all the planets and the countless stars move about it as a common center. Ultimately it became known that space includes many solar systems and that the sun is but the center of one system within the universe. Modern astronomy makes the universe one grand whole, so widely extensive, entirely endless in space, that the mind is incapable of conceiving any limits or fixing boundaries beyond which its influence does not extend. In this sense the universe includes not only the planets and all the satellites known to us, but embraces every particle of creation. It comprises not only our solar system, but includes the numerous other similar systems of which many of the fixed stars seem to be the centers. See **Solar System.**

UNIVERSITY (ū-nĭ-vẽr'sĭ-tỹ), an institution of higher learning. It affords facilities for superior instruction, or for the examination of students who have already been instructed in certain higher courses, and has power to confer degrees to those making a creditable record in the branches of study pursued. The term originated from the word *universitas,* meaning the whole of anything, and was first used to designate a collection of teachers and learners. Hence, the word university originally had a very various application, indicating a society or body of musicians, priests, teachers, or players. The modern universities had their rise in Europe in the Middle Ages and were at first essentially ecclesiastical. Gradually their functions became specialized, thus giving rise to several faculties, each of which became devoted to some important branch of instruction, as is now the case in Germany. In other instances colleges or subordinate teaching bodies were formed, as in the large universities of England, where the relation of the university to the college is similar to that of a federal government to the several states composing a federation.

The name university has been applied loosely to many institutions in the United States, though this country has the largest number of educational establishments bearing that name. However, many of them have a standard lower than that of others which are institutes, or colleges, and some represent only a single faculty. At present there is a general tendency to restrict the word to institutions having affiliated professional schools and offering nonprofessional instruction beyond the bachelor's degree. A large number of the American universities are sectarian, though none of this class belongs to the Federal or State institutions. In the states a number of universities are maintained, some of which have a fully developed university course, while others answer more especially to the term normal school or college. The American universities and colleges include about 600 different institutions. They have 35,650 professors and teachers and about 703,750 students. The libraries of these institutions have 33,200,000 volumes. These estimates are taken from the latest reports available, but conditions are always such that the number of students varies greatly from year to year. The money invested in schools of technology, colleges, and universities in the United States is placed by statisticians at $925,550,000.

The students studying medicine, law, and theology in the American universities are placed at 88,500, while the number pursuing studies in

the liberal arts and technology is given at 615,250. Most of the institutions of higher learning in America are coeducational, though some are open only to men and others only to women. Apparently there is a constant increase in the number of students who make it an objective point to study politics, science, sociology, jurisprudence, and similar topics. Among the most important institutions of the United States classed as universities are the Armour Institute of Technology, Chicago, Ill., founded in 1893; Boston University, Boston, Mass., 1872; University of California, Berkeley, Cal., 1868; Central High School, Philadelphia, Pa., 1837; University of Chicago, Chicago, Ill., 1889; College of the City of New York, New York City, 1847; Columbia University, New York City, 1754; Cornell University, Ithaca, N. Y., 1818; Columbian University, Washington, D. C., 1821; Girard College, Philadelphia, Pa., 1848; Harvard University, Cambridge, Mass., 1636; University of Illinois, Champaign, Ill., 1867; Indiana University, Bloomington, Ind., 1820; University of Iowa, Iowa City, Iowa, 1856; University of Kansas, Lawrence, Kan., 1866; Lake Forest University, Lake Forest, Ill., 1876; Leland Stanford Junior University, Palo Alto, Cal., 1891; Massachusetts Institute of Technology, Boston, Mass., 1865; University of Michigan, Ann Arbor, Mich., 1837; University of Minnesota, Minneapolis, Minn., 1868; University of Nebraska, Lincoln, Neb., 1871; New York University, New York City, 1831; Northwestern University, Evanston, Ill., 1855; Ohio State University, Columbus, Ohio, 1870; Pratt Institute, New York City, 1887; Princeton University, Princeton, N. J., 1746; University of Nashville, Nashville, Tenn., 1785; Washington University, Saint Louis, Mo., 1853; University of Wisconsin, Madison, Wis., 1849, and Yale University, New Haven, Conn., 1701. Each of the foregoing institutions has an attendance of more than 1,000 students. Other institutions of importance include William and Mary College, Williamsburg, Va., 1693; Brown University, Providence, R. I., 1764; Dartmouth College, Hanover, N. H., 1769; Johns Hopkins University, Baltimore, Md., 1776; Rutgers College, New Brunswick, N. J., 1770; University of Georgia, Athens, Ga., 1801; Amherst College, Amherst, Mass., 1821; Washington and Lee University, Lexington, Va., 1749, and Vanderbilt University, Nashville, Tenn., 1875.

Germany is noted for its great universities, which at present rank as the most famous institutions of learning in the world. Fully twenty institutions in the German Empire may be classed as more than national, since they attract a large number of students from all parts of the world. The oldest European institutions of higher learning are those of Bologna and Paris, both dating as universities from the 13th century. England and Scotland each have four universities; Ireland, two; and Italy, twenty.

The universities of Russia are modeled after those of Germany, both in the courses of study and in the discipline, and many of the professors are German. They include those of Saint Petersburg, Moscow, Kiev, Helsingfors, Kazan, and Dorpat; the last named has a noted theological faculty. The most celebrated Greek university is at Athens. It was established in 1837, has four faculties, and is organized on the German plan. The principal Mohammedan university is at Cairo, Egypt. Celebrated universities are maintained in China, Japan, and India. A number of excellent institutions carrying university courses are maintained in Australia and South America, particularly in Peru, Colombia, Argentina, and Brazil. Below is a list of the larger institutions of the world, outside of the United States, arranged according to their attendance. The number of students given in this list is from various sources, representing the attendance in 1925:

LOCATION.	COUNTRY.	STUDENTS.
Paris	France	21,485
Berlin	Germany	12,622
Madrid	Spain	9,290
Vienna	Austria	11,873
Naples	Italy	6,689
Moscow	Russia	9,660
Budapest	Hungary	6,721
Munich	Germany	8,600
Athens	Greece	8,512
Oxford	England	5,550
Leipsic	Germany	6,095
Leningrad	Russia	9,981
Cambridge	England	5,230
Prague	Czecho-Slovakia	8,814
Kiev	Russia	3,000
Manchester	England	2,250
Edinburgh	Scotland	3,680
Turin	Italy	2,690
Lyons	France	3,288
Bordeaux	France	2,752
Helsingfors	Finland	2,744
Copenhagen	Denmark	4,000
Rome (Royal University)	Italy	5,769
Tokio	Japan	5,058
Barcelona	Spain	3,300
Toulouse	France	2,414
Glasgow	Scotland	4,430
Gratz	Austria	2,746
Toronto	Canada	5,300
Halle	Germany	3,021
Bonn	Germany	2,740
Bucharest	Rumania	10,850
Louvain	Belgium	3,244
Freiburg	Germany	3,080
Kharkov	Russia	2,590
Padua	Italy	2,575
Lemberg	Czecho-Slovakia	2,575
Montpellier	France	2,515
Upsala	Sweden	2,510
Breslau	Germany	4,500
Montreal	Canada	5,500
Cracow	Poland	2,490
Würzburg	Germany	3,425
Liége	Belgium	2,420
Palermo	Italy	3,675
Göttingen	Germany	3,053
Lille	France	1,950
Havana	Cuba	2,350
Urbana	Italy	2,340
Brussels	Belgium	2,315
Strassburg	France	2,569
Manila	Philippines	1,260
Tübingen	Germany	2,925
Salamanca	Spain	1,250
Dublin	Ireland	1,351
Heidelberg	Germany	2,673
Christiania (Oslo)	Norway	1,200
Amsterdam	Holland	1,775
Erlangen	Germany	1,860
Pisa	Italy	1,750
Santiago	Chile	1,140
Bern	Switzerland	1,762

UNIVERSITY EDUCATION, Coöperative, the movement to promote a "noble community of learning" among the world's great universities. For some years there has been such affiliation as permits a student to work for the higher degrees in several different institutions. This enables him to get the best out of each university and, as a form of educational "reciprocity," is growing in favor. A new and powerful impetus was given to the idea of mutual work in university education by Cecil Rhodes, the "Colossus of South Africa," whose bequest of $10,000,000 created in 1902 the Rhodes scholarships at Oxford, England. Under liberal conditions students from the United States, Germany, and the British colonies are appointed to these scholarships. This promises to result in strengthening the racial and intellectual bonds by which a world civilization is held together.

Among American universities there is now frequent interchange of professors. Members of the Harvard faculty, for example, lecture for a semester or a year at the University of California; men from Johns Hopkins do the same at the University of Chicago, and so with others. Similar exchanges of professorial service have taken place also between American and foreign institutions. But the most noteworthy step that has yet been taken in university coöperation was initiated by the German emperor, Wilhelm II., in 1904. The emperor, at his New Year's reception to the diplomatic corps in that year, suggested to Charlemagne Tower, the American ambassador, an official interchange of professors between German and American universities. The suggestion was worked out in detail at an informal conference between President Nicholas Murray Butler, of Columbia University, the German emperor, and the Prussian minister of education, Herr Althoff, at Wilhelmshöhe, in August, 1905. Its practical application was made possible on the American side by the munificence of James Speyer of New York City, who placed $50,000 in the hands of the trustees of Columbia University for the endowment of a professorship in the University of Berlin.

This professorship, known as the Theodore Roosevelt Professorship, is tenable for one year at a time. The incumbents are nominated by the trustees of Columbia University and confirmed by the Prussian minister of education. They will lecture on American history and institutions, including American political economy, Their services may be extended to other German universities. The first lecturer appointed to this professorship was John William Burgess, dean of the faculty of political science at Columbia. He began his work in the winter of 1906-1907. The government of Germany endowed a similar professorship at Columbia University and Hermann Schumacher, professor of political economy in the University of Bonn, was nominated by the Prussian minister of education as the first incumbent. The appointment was confirmed by the authorities of Columbia University and Dr. Schumacher entered upon his duties also in the winter of 1906-1907. This arrangement marks an important epoch in education which has since borne good results in many institutions.

UNIVERSITY EXTENSION, a plan whereby the benefits of university work may be enjoyed by persons residing in different communities from those in which such an institution is located. The movement to carry means of higher education to persons of all classes and of both sexes by organizing local associations in suitable places dates from 1872, when the University of Cambridge, England, appointed a syndicate to organize lectures by university men. These lectures, which have since grown to marked popularity, are similar in character to those given at Cambridge. A like plan was established by Oxford University in 1885 The university extension movement was first introduced into the United States in 1887 by J. N. Larned, superintendent of the Buffalo library, but was recommended by persons connected with Johns Hopkins University in the same year. No widespread movement was inaugurated until the plan was taken up by the University of Pennsylvania, in 1890, and an organization was formed under the name of the American Society for the Extension of University Teaching. Since then the movement has spread into all parts of the country and has been taken up by all the larger colleges and universities. In some sections of the country the institutions of higher learning have formed coöperative associations, thus giving the movement the prestige of combined effort and the advantage of associating the talent of a number of eminent instructors and lectures.

The University of Chicago maintains a special department of this work. Those joining the classes in different communities are organized into university extension centers. These centers have regular meetings, usually twice each month, at which the topics outlined in a well-planned course of study are discussed under the direction of a local leader, and lectures are given in addition by eminent educators or by the ablest professors of the institutions managing the university extension work. The course of study is usually issued in installments of twelve numbers, each covering a month's work, and the whole course outlines one subject, such as political science, literature, or history. Those completing the work and passing a satisfactory examination are granted certificates, the examination work being done under the direction of some one appointed by the association, and the papers are afterward sent to the institution having charge of the enterprise, where they are inspected and certificates are issued according to the work done. The movement as a

whole has been of incalculable benefit, since it has carried superior thought and consecutive study to communities otherwise deprived of such advantages and given many persons the attendant benefits. The plan outlined in this article is in successful use by many institutions and the branches studied cover a wide range of knowledge.

UNIVERSITY OF CHICAGO. See **Chicago, University of.**

UPAS (ū'pȧs), a tree of the nettle family, which yields an acrid, milky juice that contains a virulent poison, the *upas antiar.* It is native to Java and other islands of the East Indies and several species of it are indigenous to tropical Africa. The stem is naked for the first 50 to 80 feet and its height often exceeds 100 feet. The leaves are lanceolate and alternate and the fruit is a kind of drupe, covered with fleshy scales. It was long thought that mere contact with the tree would result in injury to animals and plants, but it is known that the poisonous properties are similar in effect to those of the poison ivy. Natives use the juice of the tree in poisoning their arrows. Several species have been described, some of which yield an inner bark that is valuable in making bags and clothing. In 1844 specimens were brought to Europe and several species are now grown in gardens and hothouses.

UPHAM (ŭp'ȧm), **Charles Wentworth,** clergyman and author, born in Saint John, New Brunswick, May 4, 1802; died in Salem, Mass., June 15, 1875. His early life was spent on a farm, but he was afterward apprenticed to an apothecary. Subsequently he attended Harvard University, from which he graduated in 1821, and later pursued a course in theology. He became pastor in Salem in 1824, remaining at the First Church until 1844. After resigning on account of ill health, he became editor of the *Christian Register,* and subsequently traveled and lectured. In 1849 he was elected to the State Legislature and subsequently served in Congress. His best known works include "Prophecy as an Evidence of Christianity," "Memoir of Timothy Pickering," "Letters on Logos," "Life of John Charles Fremont," "History of the Salem Witchcraft Delusion of 1692," and three volumes of "Life of Timothy Pickering."

UPMARK (ụp'märk), **Gustaf Heinrich Vilhelm,** art-historian, born in Stockholm, Sweden, in 1844; died in 1900. He studied at Upsala, where he graduated in 1869, and in the same year secured an appointment in the National Museum at Stockholm. His efficient work caused his appointment as director of that institution in 1880. He founded the Gripsholms Society, under whose direction the ancient castle of the Vasa dynasty was restored. He published a number of historical works and essays relating to art in Sweden. His chief work of interest is a publication entitled "Architecture of the Period of Renaissance in Sweden, 1530-1760."

UPSALA (ŭp-sä'lä), or **Upsal,** a city of Sweden, on the Fyris River, 42 miles northwest of Stockholm. It occupies a fine site in a fertile valley and may be reached by a number of railways. The University of Upsala is the chief educational institution in Sweden. It was founded in 1477, has a library of 300,000 volumes, and is attended by 1,510 students. This library contains a Bible in which Luther and Melanchthon wrote comments. The cathedral, founded in 1258, is a beautiful structure in the Gothic style. In it are the tombs of Linnaeus, Gustavus Adolphus, and several other prominent men of Sweden. Upsala has beautiful botanical and zoölogical gardens, numerous secondary schools and churches, the Museum of Northern Antiquities, and the Ultuna Agricultural Institute. It has fine public improvements, including pavements, sewerage, waterworks, gas and electric lighting, and ample facilities for rapid transit. About three miles north of the city is the town of Gamla Upsala, which occupies the site of the traditional capital and fortress built by Odin. Although it has some manufactures and a brisk trade, it is important mainly as an educational center. Population, 1921, 29,081.

UPSHUR (ŭp'shẽr), **Abel Parker,** statesman, born in Northampton, Va., June 17, 1790; died Feb. 28, 1844. He studied law at Richmond, was admitted to the bar in 1810, and began a successful practice in that city. In 1824 he was elected to the State Legislature and two years later became judge of the general court in Virginia. He was made Secretary of the Navy by President Tyler, in 1841, and two years later succeeded Daniel Webster as Secretary of State. Owing to his proslavery policy, he favored the annexation of Texas. His death occurred by an explosion while on board the *Princeton,* a steamer of the United States navy.

UPTON (ŭp'tŭn), **Emory,** soldier, born at Batavia, N. Y., Aug. 27, 1839; died March 15, 1881. He studied at Oberlin and the United States Military Academy and joined the Federal army at the beginning of the Civil War. During the first year of the war he fought at Bull Run and was stationed at Fort Washington. Later he took part in the Peninsular and Maryland campaigns. He served in the Battle of Antietam, was in the Rapidan campaign, and commanded a brigade in the battles of the Wilderness, distinguishing himself particularly at Spottsylvania Court House. In 1864 he was transferred to the Shenandoah valley and later in the same year to the West, where he operated successfully until the close of the war. He was commandant of cadets at West Point from 1870 until 1875, and in the latter year was sent on duty to Asia and Europe. His death resulted from suicide, committed while in a state of insanity.

URAL (ū'rȧl), a river rising in the Ural Mountains and forming a part of the boundary between Asia and Europe. The general course

is toward the south. Although it has a length of 1,385 miles, it is shallow in the greater part of the course and is not valuable in commerce. It flows into the Caspian Sea by a considerable delta. Only a small portion is navigable, but it contains extensive fisheries. The lower course of the river is strongly fortified. Orenburg and Ouralsk are the chief cities on its banks. The affluents include the Or, Kizie, and Sakmara rivers.

URAL MOUNTAINS, a chain of mountains in Eurasia. They form the principal part of the boundary between Asia and Europe, stretching southward from the Kara Sea fully 1,875 miles. These mountains contain a number of parallel ridges, from which swells and spurs extend at nearly right angles, and attain heights of 4,500 to 5,515 feet. There is a gradual rise from the Kara Sea until the north central part is reached, where the chain attains its highest summits. The slopes are gradual in the greater part of these highlands. Extensive deposits of minerals abound, chiefly coal, iron, copper, platinum, gold, topaz, emerald, diamond and amethyst. The northern region has a very cold climate, but the southern part is favorable to the production of cereals and live stock and contains valleys of great fertility. Among the streams rising in the Ural Mountains are the Petchora, Kama, Tobal, and Ural rivers.

URANIA (ū-rā′nĭ-à), in Greek mythology, one of the nine Muses, a daughter of Zeus and Mnemosyne. She was the goddess of astronomy and was usually represented with a staff pointing at a celestial globe.

URANIUM (ū-rā′nĭ-ŭm), a rare metallic element discovered by Klaproth in 1789, so named from the planet Uranus. It occurs chiefly in pitchblende, has a silvery luster, and melts at a bright red heat. Compounds of uranium are obtained from the uran-ocher found at Cornwall, England. Sodium uranate, known commercially as uranium yellow, is one of many salts obtained from it. This product is used in painting on glass and porcelain. Uranoso-uranic oxide, which is obtained from uranium, is used to some extent in producing a black glaze on porcelain. Becquerel, in 1896, demonstrated that certain radiations are emitted by uranium and by the salts of uranium.

URANUS (ū′rà-nŭs), or **Coelus,** in Greek legends, the deity representing the light and air of heaven. He is sometimes mentioned as the son of Gaea, the earth, but chiefly as her husband. Classical writers represent him as the father of Oceanus, Saturn, the Cyclops, Themis, Mnemosyne, and Tethys. Since he had a feeling of natural aversion to his children, he confined them in Tartarus, but Gaea induced Cronos, the youngest of the Titans, to mutilate and dethrone him. It is recounted that Gigantes sprang from drops of his blood, and that Venus was evolved from the foam that surrounded him while he swam in the sea.

URANUS, one of the superior planets, occupying a place between Saturn and Neptune. The ancients knew of this planet, but it was rediscovered by William Herschel in 1781, after the construction of his great reflecting telescope. His attention was attracted by a star in the constellation Gemini, which he observed as having a disk different from the others. He announced soon after that he had discovered a new comet, but a few months later the error was revealed and the body was admitted to be a member of the solar system. The diameter of Uranus is about 31,900 miles. Its density is about equal to that of ice, somewhat lighter than water. The mean distance of Uranus from the sun is placed at 1,781,900,000 miles and its year is about 84 of our years. Little is known of the seasons of Uranus, but the length of its day is placed at between nine and ten hours, and the light received from the sun is estimated at about the quantity which would be afforded by 300 full moons. Uranus has four satellites, which revolve round it from east to west and move in planes nearly perpendicular to the ecliptic, a circumstance not known in the case of any other planet. The satellites are Ariel, Umbriel, Titania, and Oberon. See **Satellite.**

URBAN (ûr′bạn), the name of eight popes, who reigned as bishops of Rome in the period between 223 and 1644. Urban I. reigned from 223 to 230 and is thought to have suffered martyrdom. Urban III. was Pope from 1185 to 1187 and was succeeded by Gregory VIII. Urban IV. succeeded to the pontificate in 1261 and in 1265 was succeeded by Clement IV. Urban VII. was elected Pope on Sept. 15, 1590, but died before consecration, on Sept. 27, 1590. The other popes of the same name are treated in the articles following. See **Pope.**

URBAN II., Pope of Rome, born in Lagery, France, about 1042; died July 29, 1099. He was educated for the church and entered the cloister at Cluny, of which he became prior. Gregory VII. made him cardinal of Ostia in 1078. He was elected Pope at Tarracina in 1088, when Rome was in possession of the anti-pope, Clement III. The important events of his pontificate include the expulsion of his rival, Clement III., from the fortresses of Rome and his connection with the first Crusade, which united Christendom into a vast warlike confederacy under the Pope. His decision and energy caused the capture of Jerusalem by the Crusaders, but he died fourteen days after that event took place.

URBAN V., Pope of Rome, born in Grisac, France, in 1309; died in Avignon, Dec. 19, 1370. He was a Benedictine monk, and subsequently became doctor in canon law, teaching at Montpellier and Avignon, and for some time held the office of abbot of Saint Victor in Marseilles. Later he served as papal legate in Naples and Sicily. He was elected Pope on Oct. 28, 1362, as successor to Innocent VI. His

pontificate is noted for the masterful effort made to restore the papacy to Italy and he was the last of the popes to reside at Avignon, France. He transferred the papal seat to Rome in 1367, where he was greeted with joy by the clergy and people. His reputation is that of a man of piety and religious zeal. Writers speak of him as a protector of letters and a patron of learning. He was succeeded by Gregory XI.

URBAN VI., Pope of Rome, born in Naples, Italy, in 1318; died Oct. 15, 1389. He was a devout and learned monk and in 1377 became archbishop of Bari. The people of Italy made a demand for the election of an Italian Pope, which was largely instrumental in him being chosen to succeed Gregory XI. in 1378. His zeal to carry out reforms brought him in contact with organized opposition among the cardinals, thus causing a schism in the church that was not overcome until about forty years later. Twelve French and three Italian cardinals formed a union against the newly elected Pope and, after repudiating their previous action, elected Robert of Geneva to the pontificate, who assumed the title of Clement VII. Urban continued to hold his seat at Rome, while Clement officiated at Avignon. The two popes excommunicated each other and continued to maintain authority over the two divisions of the church, each resorting to extreme measures in order to maintain his claim. Clement was put to flight by troops sent against him from Rome, but Charles, King of Naples, began to resist the papal pretensions and caused Urban to be besieged at Nocera, whence he afterward fled to Genoa. He died soon after from an injury sustained by falling from his horse.

URBAN VIII., Pope of Rome, born in Florence, Italy, in 1568; died July 29, 1644. He descended from a wealthy Florentine family, who gave him the advantages of a liberal education. After holding several important charges in the church, he was elected as successor to Gregory XV. in 1623. His pontificate of 21 years includes the most important period of the Thirty Years' War, and it is due to him that the temporal power of the Papacy was retained in Italy. In 1633 Galileo was summoned to Rome to make his celebrated recantation, but, on the other hand, Urban patronized Claude Lorraine and others. Urban VIII. did much to improve the city of Rome, enlarged the Vatican library, and founded the College of the Propaganda. He is the author of a number of Latin verses and hymns and of several comments on the Scriptures. About seventy sonnets written by him were published in 1640. Innocent X. succeeded him.

URBANA (ûr-băn'à), a city of Illinois, county seat of Champaign County, 75 miles northeast of Springfield, on the Wabash and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. It is surrounded by an agricultural and mineral region and has a number of extensive machine shops and manufacturing establishments. The principal buildings include the high school, the public library, the county courthouse, the Y. M. C. A. building, the Masonic Temple, and many fine churches. It has Crystal Lake Park and is the seat of the Eastern Illinois Memorial Sanitarium. The University of Illinois, situated both in Urbana and Champaign, is one of the leading schools of America. It has public waterworks and sanitary sewerage. The place was settled in 1824 and incorporated in 1860. Population, 1900, 5,728; in 1920, 10,230.

URBANA, a city in Ohio, county seat of Champaign County, 94 miles northeast of Cincinnati, on the Pennsylvania, the Erie, and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. It is surrounded by a fertile farming and dairying country. The notable buildings include the county courthouse, the public library, the high school, and the Urbana University. Among the manufactures are machinery, cigars, furniture, brooms, woolen goods, and tin cans. Electric and gas lighting, public waterworks, and sanitary sewerage are among the municipal improvements. The place was platted in 1805 and was garrisoned in 1812. Population, 1900, 6,808; in 1920, 7,621.

URBINO (ŏŏr-bē'nō), a town of Italy, in the Apennine region of Marches, about twenty miles from the Adriatic Sea. It is situated between the Foglia and Metauro rivers, near the valley of the latter. Its magnificent palace was formerly occupied by the dukes of Urbino, and surrounding it are walls dating from the 14th century. The Albini palace, built by an Albanian family, is also at Urbino. This family furnished one of the popes, Clement XI. Urbino has manufactures of pins, matches, earthenware, utensils, and pottery. The city dates from the time of the Romans and in the Middle Ages became the seat of independent dukes. It was made a part of United Italy in 1860. Population, 1922, 18,968.

URCHIN. See **Sea Urchin.**

URIM AND THUMMIM (ū'rĭm, thŭm'-mĭm), a contrivance mentioned in connection with the breastplate of the Jewish high priest and employed as a sort of divine oracle. The exact nature of this contrivance is not known, but it is supposed to have consisted of four rows of precious stones bearing the names of the twelve tribes, and in connection with these were two small figures or images. The figures are thought to have personified light and perfection, but some writers think that they signified truth and revelation, and others that they personified doctrine and judgment. The Urim and Thummim is mentioned only in or before the time of Solomon, when it was put over the breast of the high priest as he entered into the presence of Jehovah. Joseph Smith used the names in connection with the reading of the

plates alleged to have contained the Book of Mormon.

URINE (ū'rĭn), in mammals, the fluid which is secreted from the blood by the kidneys. In birds and reptiles, the urine is a solid or semisolid excretion. The urine of man is a clear and transparent fluid with a normal density of 1.02. It is slightly acid, has a color which somewhat resembles amber, and chemically consists mainly of an aqueous solution of urea, salt, uric acid, and small quantities of hippuric acid. In a healthy individual it consists of 40 parts of solid matter to 960 parts of water. About two and a half pints are discharged daily by an adult, but the quantity varies somewhat, being diminished by excessive perspiration and increased by cold and by drinking large quantities of water. It is transmitted slowly but continuously by the ureters of the kidneys to the bladder, where it is retained until the distension of the organ requires its evacuation. The secretion is derived from arterial blood and is expelled by the agency of the abdominal muscles assisted by the contraction of the walls of the bladder. The urine is greatly affected by diseased conditions of the body. It may contain bile pigments, as in jaundice; sugar, as in diabetes; and albumin, as in Bright's disease. See **Kidney.**

URSA MAJOR AND URSA MINOR. See **Bear, Great and Little.**

URSO (ụr-sō'), **Camilla,** violinist, born in Nantes, France, in 1841; died in 1902. She studied music in Paris and came to the United States at the age of ten years. In 1853 she began to play successfully in New York City and subsequently toured Canada and the United States. Later she returned to France, but afterward took up her residence in New York. Her greatest successes were made in concerts with Alboni and Sontag. She was considered the most eminent female violinist in her time.

URSULA (ûr-sū'lȧ), **Saint,** a Christian martyr highly honored in Germany, commemorated by the church on Oct. 21. Writers differ as to the time in which she lived and assign her martyrdom at Cologne to various dates in the 3d, 4th, and 5th centuries. She is reputed as the daughter of Deonatus, a Saxon king. Her great beauty caused a pagan prince, named Holofernes, but afterward called Aetherius, to seek her hand in marriage. Ursula consented with the condition that he become a Christian and that he allow her and her ten companions to make a pilgrimage to Rome. The proposed pilgrimage was to cover a period of three years and each of the maidens was to be accompanied by 1,000 maiden companions, making a total of 10,000. This vast company was collected from all parts of the world and embarked from the shores of Britain in three-oared galleys. They sailed up the Rhine to Cologne and thence to Basel, where they left their galleys to proceed overland to the region of Rome and the tombs of the apostles. The country had in the meantime fallen into the hands of Attila and the Huns, but this was not known to the maiden pilgrims, who returned unaware of their danger with their galleys to Cologne. The pious virgins were immediately seized by Huns, who put them to death. However, the cruel barbarians were visited by a host of angel warriors, who smote them without mercy as a punishment for the cruel martyrdom to which they had subjected the maidens. The site on which Saint Ursula is supposed to have suffered martyrdom is now occupied by the Church of Saint Ursula.

URSULINES (ûr'sû-lĭnz), an order of nuns in the Roman Catholic Church, founded by Saint Angela Merici of Brescia (1470-1540) in 1537, so named from Saint Ursula. The institution was organized with the special object of nursing sick, educating young women, attending to the wants of the poor, and sanctifying the lives of its members. Pope Paul III. confirmed the foundation of the order in 1544. Pope Paul V. issued a bull in 1612, by which the congregation was made a religious order, with solemn vows and strict inclosure. Several distinct congregations have been formed since that time. The celebrated sister, Madeline Saint Beuve of France, belonged to the Ursulines. Convents of the Ursulines were organized in Canada as early as 1639, the first one being instituted at Quebec. They are very numerous in Austria and Germany. Ursuline convents are maintained in Saint Louis, New Orleans, New York City, Louisville, San Antonio, Cleveland, Savannah, Columbia, and a number of other cities of the United States.

URUGUAY (ōō-rō̆ō-gwī'), a river of South America, having its source in the province of Saint Catharina, in southern Brazil. The upper course is toward the west, but it makes a bold curve near the boundary of Argentina, whence it flows in a southern direction and joins the La Plata opposite Buenos Ayres. The Uruguay is important for its navigation facilities and fisheries and its basin is rich in fertile soil and an abundance of timber. Its entire length is 925 miles. The Rio Negro and Arapey are its chief tributaries. Salto, Concepcion, and Porto Ruiz are the chief towns on its banks.

URUGUAY, a republic of South America, the smallest country of that continent. It is bounded on the north by Brazil, east by Brazil and the Atlantic, south by the Atlantic and the estuary of the Rio de la Plata, and west by Argentina, from which it is separated by the Uruguay River. The area, including a few small islands, is 72,151 square miles.

DESCRIPTION. Much of the surface is fertile coast and valley land, characterized in localities by tablelands of moderate elevation. The northeastern part is hilly and from it elevated ridges extend toward the southwest, where the country resembles the pampas of Argentina

The highest elevations in the northwest do not exceed 2,000 feet. Sandy and marshy tracts of low land border on the ocean. Forests of considerable extent occur in most parts of the country, including the cedar, acacia, palm, aloe, myrtle, poplar, walnut, rosewood and eucalyptus.

The larger part of the drainage is by the Rio de la Plata, the Uruguay, and the Rio Negro. The Rio Negro rises in the southern part of Brazil and, after a course of 250 miles toward the southwest, flows into Uruguay. The Rio Arapey flows into the Uruguay. Lake Mirim, on the border of Brazil, receives the inflow of the Rio Cebollali. This lake affords considerable facilities for navigation.

Uruguay has a mild and healthful climate and an abundance of rainfall. The thermometer seldom falls below 33° and along the shores rarely rises above 85°, while the summer heat in the interior seldom passes above 100°. Cold storms blow from the southwest during the winter, when the highland regions are visited by occasional snows.

Resources. The minerals are abundant in the hilly district of the northeast, but mining is not important as an industry. Gold, silver, iron, zinc, lead, sulphur, coal, antimony, and tin exist in paying quantities. Granite and limestone of good quality are found in the hilly part of the north. The fisheries of the coast yield many species of marketable fish, but those of the interior, though valuable, have not been developed to a considerable extent.

The interior highlands are well grassed, but here the hot summers cause the grasses to dry early in some sections. Wild animal life is still abundant, including the tiger or ounce, puma, deer, wild dog, tapir, fox, water hog, and wild cat. Birds of song and plumage are numerous and the marshy lagoons are frequented by large numbers of water fowl. Among the reptiles are several species of lizards, rattlesnakes, tortoises, and turtles. More than 2,000 species of insects abound, including venomous spiders and scorpions.

Industries. Farming is the principal industry and corn and wheat are the chief cereals, both of which are exported. About half the cultivated area is utilized in growing wheat. Corn of a good quality is grown. Other crops include oats, barley, linseed, rye, and hay. Olives, grapes, lemons, oranges, peaches, apples, cherries, pomegranates, and figs are grown in abundance. Stock raising is carried on extensively, but the largest interests are vested in raising sheep and cattle. Other live stock includes horses, mules, swine, goats, and poultry.

Manufacturing is not an extensive enterprise, but considerable development has been made in the output of clothing, utensils, and machinery. Other manufactures include flour and grist, leather, cured and salted meats, canned fish and fruits, cheese and canned milk, and lumber and lumber products. The exports include meats, cattle, wool, fruits, and cereals, while the imports consist principally of textiles, hardware, and machinery. Commerce is largely with Brazil, Argentina, Germany, France, Great Britain, Spain, and the United States.

Transportation. Uruguay has 685 miles of maritime and river navigation. Large steamers ply on the Rio de la Plata and the Uruguay, and small craft navigates the Rio Negro. Lake Mirim is important as an outlet on the border of Brazil. The railroad lines in operation include 1,415 miles and about 5,500 miles of highways are in an improved state. Communication by telegraph and telephone lines is general throughout the populated sections of the country. The post office system is well managed. The peso is the monetary unit and is equal to $1.034.

Government. The government is based on a constitution that dates from 1830. It vests the executive authority in the president, who is selected by male suffrage for a term of four years. He is assisted by a cabinet of five members, including those of the interior, finance, instruction and public work, war and marine, and foreign affairs. Legislative power is vested in the congress, which consists of a senate and a chamber of deputies. Each province or department is represented in the congress by one senator, who is chosen for a term of six years by an electoral college, the members of which are elected by popular vote. The chamber of deputies is composed of 69 representatives, elected for three years by popular suffrage. Uruguay is divided into nineteen departments or provinces for the purpose of local government. Each of these is ruled by an executive appointed by the president, but local legislation is vested in an administrative council for each department, whose membership is selected by popular vote. The smallest province has an area of 256 square miles, while the largest contains 8,074 square miles.

Education. The government contributes annually to the maintenance of a system of elementary and secondary schools, at which attendance is free and compulsory. These schools are maintained in part by local taxation. Montevideo is the seat of the University of Uruguay, which has an attendance of 450 students. Two normal training schools are maintained for the instruction of teachers. Other educational institutions include parochial schools, seminaries, a military institute, and an industrial school. Spanish is the official language. Roman Catholic is the state religion, but all other faiths are tolerated.

Inhabitants. About seventy per cent. of the inhabitants are native born. This element is composed chiefly of people of Spanish descent, but includes a considerable element of Indian blood. European immigration is chiefly from Spain, France, Italy, and Germany. A large

element of Brazilians is found in the northern part, and the western section contains many people who entered the country from Argentina. Montevideo, on the estuary of the Rio de la Plata, is the capital and largest city. Other cities include Salto, Mercedes, and Paysandu. Population, 1922, 1,543,040.

HISTORY. Uruguay was first visited by Juan Diaz de Solis, a Spanish explorer, in 1512, who found there a class of natives called Charuras. In 1516 he made a second visit to the region, but was slain by the natives in Colonia. Sebastian Cabot visited the region in 1527, but was defeated by the natives and compelled to retreat. The country was finally conquered by Jesuits in the time of Philip III. In the meantime numerous commercial settlements were formed by the Portuguese, but the Spanish established themselves at Montevideo in 1729. The region was long a part of Argentina, but in 1750 organized as an independent provincial government. A long struggle between the revolutionary government of Buenos Ayres and Brazil for supremacy in Uruguay finally made possible the establishment of the present republic in 1830. It was subsequently invaded at various times until 1870, but since then its development has kept pace with that of other South American states. Feliciano Viera was elected president in 1915.

URUMIAH (o͞o-ro͞o-mē'ä), or **Urmia,** a city in Persia, ten miles west of Lake Urumiah and about fifty miles southwest of Tabriz. It occupies a fine site in a fertile valley about 4,500 feet above sea level and is defended by a wall of brick and mud. The surrounding country produces large quantities of grapes, vegetables, and flowers. It is visited regularly by caravans and has a brisk trade. The city is beautified by fine gardens, though it includes only a few buildings of importance. A Nestorian bishop has his palace in the city, and it is the seat of a number of foreign missionaries and mission schools. It has manufactures of carpets, clothing, earthenware, and furniture. Urumiah is the reputed birthplace of Zoroaster. Population, 48,500.

URUMIAH, a large lake of northern Persia, about 160 miles west of the Caspian Sea. It is 82 miles long and 26 miles wide. The area is 1,960 square miles. It has no outlet to the sea, hence its waters are exceedingly salty. The Jage-tu River, 138 miles long; the Ta-tu, 88 miles long; and the Aji-su, 175 miles long, flow into it, but the average depth does not exceed twenty feet. Fish and mollusks do not live in its waters, being too strongly impregnated with saline matter to sustain animal life. Extensive deposits of salt occur in the vicinity of the lake, which is itself gradually decreasing in depth and leaving a belt of saline deposits on its shores. Maragha, a town of 25,000 inhabitants, is situated 22 miles southeast of the lake.

USBEKS (ŭs'bĕks). See **Uzbeks.**

USEDOM (o͞o'zĕ-dôm), an island in the Baltic Sea. It is situated near the mouth of the Oder and belongs to Germany. The island is 35 miles long and 15 miles wide. It has an area of 150 square miles. The shape is very irregular, being indented by numerous bays and otherwise diversified by peninsulas and capes. For government purposes the island is a part of Pomerania. It is traversed by a railroad, which enters the island from the mainland, crossing the strait by an extensive iron bridge. The town of Usedom is on the southern shore and the port of Swinemunde is on the northern coast. Population, 1923, 34,628.

USURY (ū'zhŭ-rў), a term originally applied to the practice of lending money at interest, but now restricted to the charge of excessive rates of interest and to rates higher than those allowed by law. Legislation on the subject of usury dates from ancient times, but the practice attracted the most scrutinizing attention in the Middle Ages. In Athens, Solon canceled all the debts made on the security of the person or land of the debtor and established a law that subsequent loans could not be made on the bodily security of the borrower, but instead provided that the creditor should be limited to property security. Aristotle was persistent in the opinion that no profit should accrue to the lender of money, a view approved quite generally by the church throughout the Middle Ages. This position, taken by the fathers of the church and the Christian lawmakers, was the means of giving the Jews material advantages in the enterprise of dealing in money. They loaned all their available funds at lucrative rates, and in many cases excited such opposition by their thrift resulting from money lending that they were expelled from many countries, as was the case in England in 1290. At present all nations recognize money lending as an honorable enterprise, but protect the borrowing class by limiting interest charges to reasonable rates. In most instances the legal rate is from five to six per cent., though rates ranging from seven to ten per cent. may be charged in case the contract so specifies. Contracts providing a rate of interest greater than that allowed by statutory law are not collectible in the courts.

UTAH (ū'tä), a western State of the United States, popularly called the *Salt Lake State.* It is bounded on the north by Idaho and Wyoming, east by Wyoming and Colorado, south by Arizona, and west by Nevada. The length from north to south is 350 miles, the breadth is 280 miles, and the general shape is rectangular. All the boundaries are formed by lines of latitude and longitude. The area is 84,970 square miles, of which 2,780 square miles are water surface.

DESCRIPTION. The surface is diversified by high mountains, plateaus, and valleys, much of it being fertile, though arid. Utah occupies a favorable position in the great basin and

through its center, from north to south, trend the chains of the Wasatch Mountains. These extend into groups and connected chains in various directions. Among the most important ranges are the Snow, Beaver, Thomas, Wah-Wah, Stansbury, Fremont, Wasatch, Raft River, and Uinta mountains. The principal peaks include Mount Hilgard, 11,460 feet; Mount Terrill, 11,600 feet; Wheeler Peak, 12,075 feet; Gilbert Peak, 13,690 feet; and Mount Peale, 12,930 feet.

The drainage is wholly into the interior lakes, which have no outlet to the sea, and into the Gulf of California by tributaries of the Colorado River. Chief among the rivers that be-

UTAH.

1, Salt Lake City; 2, Ogden; 3, Logan; 4, Provo City. Dotted lines indicate the principal railroads.

long to the Colorado basin are the San Juan, Grand, Green, Virgin, and Uinta. Great Salt and Sevier lakes are remarkable for the extraordinary saltiness of their waters. The lakes are apparently the remnants of a vast inland body of fresh water that formerly covered the western part of the State. Great Salt Lake is the largest of the lakes. Into it flow the Bear River from Bear Lake and the Jordan River from Utah Lake. Sevier Lake, in the west central part, receives the drainage from the Sevier River. The Linear Plateau, in the southern part of the State, presents a variation from the more mountainous north and in this vicinity the Grand Cañon of the Colorado has its beginning.

The climate is pleasant and healthful, but the rainfall is insufficient to germinate and mature all the crops without irrigation. There is a wide range of difference in the temperature, from the pleasant valleys to the towering mountain peaks, and the exposed localities have sudden changes and great extremes in summer and winter. Salt Lake City has a mean temperature of 28° in January and 76° in July. The extremes range from 30° below zero to 112° above, but these figures are for the more elevated and exposed localities. Many of the mountains are capped with snow the entire year, hence form an important agency in preserving the moisture that is needed for irrigation. As a rule the snowfall is light. The entire precipitation ranges from six inches in the southwest to seventeen inches in the vicinity of Salt Lake City.

Mining. The mineral wealth is important. Silver is the most abundant mineral and the annual output has a value of $15,500,000. Gold takes rank next to silver and the annual yield is placed at $4,250,000. In the production of copper Utah usually takes fourth rank. It likewise holds a high place in the production of salt. The State ranks third in the output of lead. Sulphur deposits of great value are worked in Millard and Washington counties and extensive fields of coal abound in Emery and Summit counties. Natural gas is found in large quantities in several parts of the State, especially in the vicinity of Salt Lake City, to which it is piped for use in the industries. Other minerals include granite, sandstone, limestone, gypsum, onyx, clays, and quicksilver.

Agriculture. Farming is the chief occupation. The farms are owned largely by their occupants and average 212 acres. Irrigation is employed extensively with good results. In the cultivation of sugar beets Utah has second rank. Wheat is the leading cereal and is cultivated on a larger area than all the other cereals combined. Oats, corn, barley, and rye are grown successfully. Hay and forage crops exceed in acreage all others. Other crops include buckwheat, potatoes, flax, hemp, tobacco, and small vegetables. Many varieties of fruit are grown, such as grapes, apples, cherries, peaches, and apricots. Figs, lemons, and oranges yield well in the southern part.

The State has a vast area that produces nutritious grasses, hence has large interests in the live-stock industry. A material increase is shown within the past decade in the number of sheep, which are usually well graded, and in the quantity of the wool clip the State generally takes eighth rank. Large interests are vested in the cattle industry, both as an enterprise for obtaining meat and dairy products. Many large ranches are devoted exclusively to rearing horses, but as a rule the ranching is diversified in that a variety of animals are reared on the same ranch. Swine are grown profitably in sections where the climate is suitable for the cultivation of corn. Other domestic animals include mules, goats, and poultry.

Manufactures. The materials for manufacturing purposes are varied and extensive.

The mountains and plateaus contain forests of cedar and pine, while the lower altitudes are skirted by groves of aspen, box elder, willow, and cottonwood. The lakes yield catches for canning and carp culture has greatly extended the fisheries. Beet sugar is manufactured on a large scale from native-grown beets, which produce profitably in the valleys, and much is done in canning and preserving fruits and vegetables. However, the larger manufacturing enterprises are connected with the mining industry and consist largely of the smelting and refining of ores. Other products include flour and grist, dairy products, confectionery, salt, packed meat, hardware, machinery, boots and shoes, clothing, and dried fruits.

Transportation. Great Salt Lake is important for navigation, but none of the rivers is utilized for that purpose. The railroad lines include 2,395 miles. Among the principal lines are the Union Pacific, the Denver and Rio Grande, the Western Pacific, the Oregon Short Line, and lines of the Los Angeles and Salt Lake. All the settled portions have more or less conveniences in the use of telephones, telegraphs, and other modern facilities. Salt Lake City is the principal railroad and commercial center and has a large jobbing and wholesale trade with points in the Rocky Mountain states. Minerals, wool, live stock, packed meat, and fruits are the leading exports.

Government. The constitution of Utah was adopted in 1895. It vests the executive authority in the governor, secretary of State, auditor, treasurer, attorney-general, and superintendent of public instruction, each elected for four years. Legislative authority is vested in the General Assembly, which consists of a senate and a house of representatives. The constitutional limit provides that the number of senators cannot exceed thirty, while the representatives cannot be less than twice nor more than three times the number of senators. The senators are elected for four and the representatives for two years, each in districts established by the Legislature. A supreme court of three or five judges has the highest judicial power. The judges of this court are elected for six years. District courts are maintained in judicial districts and the judges of such courts are elected for four years. Local government is administered by counties, municipalities, and townships.

Education. Originally the educational work was conducted largely through church organizations, but the present public school system was established in 1890. The rate of illiteracy is 1.9 per cent., based on the population ten years of age and over. The public schools are supervised under a State superintendent of public instruction, who is elected for four years and is aided by a board of education. In 1905 the Legislature enacted a law which permits the school districts to consolidate and maintain elementary and graded schools. This legislation has tended to promote a closer gradation of the educational work in the rural communities. All the larger towns and cities have high schools, which are under the direct supervision of principals or superintendents. The higher education culminates in the University of Utah, which was founded at Salt Lake City in 1850. Normal instruction is given at the State University and at a branch normal school at Cedar City. Among the institutions of higher learning are the Utah Agricultural College, at Logan; the Salt Lake Collegiate Institute, Salt Lake City; the Brigham Young College, Logan; the All Hallow's College, Salt Lake City; the Latter Day Saints' College, Salt Lake City; and the Brigham Young Academy, Provo City. About three-fourths of the inhabitants are allied with the Morman Church, although all the leading Christian denominations are represented by organizations.

Ample provisions have been made for the unfortunate and incorrigible. Ogden is the seat of the State industrial school, Provo City has an insane asylum, and Salt Lake City has the State prison. An institution for the deaf, dumb, and blind is located at Ogden.

Inhabitants. The inhabited portions are confined chiefly to the irrigated and mining districts, though ranches are maintained where grazing can be utilized profitably. About one-fifth of the inhabitants are of foreign birth. This element includes largely English, Swedes, Germans, and Danes. Salt Lake City, on the Jordan River, is the capital. Other cities include Ogden, Provo City, and Logan. In 1900 the State had a population of 276,749. This included a total colored population of 4,284, of which 217 were Japanese, 552 Chinese, 672 Negroes, and 2,623 Indians. Population, 1910, 373,351; in 1920, 449,446.

History. The region included in Utah was acquired by the Mexican cession in 1848. It was inhabited by the Ute or Utah Indians, hence its name. The early development of the State was due to the Mormons, who settled here under the leadership of Brigham Young in 1847. At that time the region was regarded a desert waste, but under the industry of the Mormons irrigation facilities were provided to redeem large areas of the land and, with the building of railroads and the development of mines, permanent prosperity was assured. A constitution was adopted and the region was named the State of *Deseret*, in 1849, but Congress refused to admit it as a State. The territorial government was established in 1850, when it included a part of Wyoming, Colorado, and Nevada, but it was reduced to its present area in 1868. Polygamy was practiced for some time by a number of the Mormons, but the Edmunds bill of 1882 largely discontinued it, and subsequently plural marriages were renounced by the Mormon Church. In 1896 it was admitted as

a State, since which time the growth of its institutions and industries has been continuous.

UTAH, University of, an educational institution at Salt Lake City, Utah, maintained for both sexes by the State. It was founded as the University of Deseret in 1850, but was closed for want of funds until 1867, when it was reopened. The present name was assumed under a new charter in 1894, when the government made a grant of 60 acres and the State appropriated $300,000 to extend and enlarge its facilities. It maintains courses in the arts and sciences, mining, law, medicine, education, finance and commerce. Admission is without examination, provided the students present a certificate from accredited schools. The faculty includes 183 instructors and professors and the attendance is 2,932 students. The university library has 95,000 volumes and the property is valued at $2,000,000.

UTAH LAKE, the largest fresh-water lake of Utah, in Utah County, 30 miles south of Salt Lake City. It extends 25 miles from north to south, is 13 miles wide, and has an area of 152 square miles. Its altitude above sea level is 4,500 feet. The lake is situated in a productive region of the State and is surrounded by railway lines. Provo City and several other towns are on its shore. The lake has an abundance of fine fish. Its outlet is into Great Salt Lake by the Jordan River.

UTAHS, or **Utes,** a tribe of Indians of the Shoshone family, formerly found in the region now occupied by Utah, Colorado, and a part of New Mexico. They subsist largely by hunting and fishing, though some engage in agricultural and pastoral pursuits. The Utahs are known as a brave and warlike class of Indians, but those on the Utah reservation are making considerable progress in industrial and educational arts. The tribe numbers about 15,000, though only about 5,000 are confined to the reservations in Utah, the others being in New Mexico, Colorado, and adjoining states.

UTICA (ū'tĭ-kà), a city in New York, county seat of Oneida County, on the Mohawk River, 95 miles west by north of Albany. Communication is furnished by the West Shore Lines, the Ontario and Western, the New York Central, the Delaware, Lackawanna and Western, and other railroads. Several electric railways furnish transportation to many parts of the State. Utica has a fine site, which rises gradually from the river, and the streets are well graded and paved. The surrounding region is a productive farming and dairying country. It has a large trade in cereals, fruit, merchandise, roses, cheese, hops, and live stock.

The city is well built of stone and brick. Among the noteworthy buildings are the county courthouse, the city hall, the Federal building, the public library, the Y. M. C. A. building, the Balliol School, the Faxton Hall Library, the high schools, and the State insane asylum. It has the Utica Orphan Asylum, the Masonic Home, the Home for the Homeless, and many fine churches and hospitals. Utica has taken high rank as an industrial center since the completion of the Barge Canal. Among the principal manufactures are cotton and woolen goods, butter and cheese, ironware, firearms, furnaces, machinery, boilers, earthenware, knit goods, and clothing. In 1772 the first settlement was made at Fort Schuyler and six years later the name was changed to Utica. It was incorporated as a city in 1832. Population, 1925, 101,604.

UTICA, anciently a city of Africa, situated about twenty miles northwest of Carthage, near the present city of Tunis. It is thought that the Phoenicians founded it about 1101 B. C. and it rose rapidly into commercial importance. Carthage was founded nearly 300 years later and the two cities long defended themselves under an alliance against the Roman invasions. It submitted to Rome in the Third Punic War, but Carthage continued its opposition and was destroyed, thus giving the former important trade advantages after the Roman conquest. It became the capital of the province and remained the emporium of Roman trade until Caesar rebuilt Carthage in 44 B. C. On its site are ruins dating from Roman occupation, including walls of an amphitheater that had a seating capacity for 20,000, baths and cisterns, and an artificial lake used by the Romans for practice in the arts of naval warfare. With the decline of Rome, it fell into the hands of the Vandals, in 439 A. D., and was afterward taken by the Byzantine leaders. It was finally captured and destroyed by the Arabs in the 8th century. Utica is mentioned in history as the city where Cato suicided.

UTILITARIANISM (ū-tĭl-ĭ-tā'rĭ-ạn-ĭz'm), the system of philosophy which teaches that all moral conduct is to subserve utility. According to this view the standard of right and wrong is based upon the theory that the happiness of mankind is the ultimate end of both ethics and philosophy. It stands in contradistinction to the theories that the test of right and wrong is to be referred to some internal sense or sentiment, which is described as conscience, moral sense, or innate moral distinctions. Some writers speak of utilitarianism as the external or the objective standard of morality, since it makes utility, not internal feeling, the standard of action. As a doctrine it may be traced back to the Greek moralists, who identified the supreme good with happiness. However, it was not emphasized in England until stated by John Locke. Later it was more clearly defined by John Stuart Mill and accepted in the philosophies of John Spencer and Sir Leslie Stephen.

UTOPIA (ū-tō'pĭ-à), the title of a romance published by Sir Thomas More in 1516, in which he describes an imaginary island called Utopia. He represents that the island was discovered by a companion of Amerigo Vespucci.

Upon this island everything was found perfect: the laws, the morals, and the politics. Here no private ownership of property was recognized, but all wealth belonged to the government, and the wants of all were supplied from the common source. All persons labored willingly to contribute to the common stock, all tolerated the religious opinions of others, all received the exact credit to which they were entitled, and, moreover, all were entirely satisfied with their state. The work was published in Latin, but was soon translated into English by Bishop Burnet. The sale of this work has been enormous, and there have been translations into many languages. It gave rise to the familiar epithet *Utopian,* a term commonly applied to visionary reforms in social and political affairs. "Looking Backward," a work published by Edward Bellamy, is quite similar in many respects to the "Utopia" of More.

UTRECHT (ū'trĕkt), a city of the Netherlands, capital of the province of Utrecht, 22 miles southeast of Amsterdam. It occupies an imposing site in a fertile region, being surrounded by beautiful fields, orchards, and flower gardens. The city has extensive railroad connections with other trade centers and additional transportation facilities are provided by two national canals. It maintains a fine system of public schools and is the seat of a musical college, a veterinary school, numerous churches, and the Cathedral of Saint Martin. The University of Utrecht was founded in 1623 and now has an attendance of 875 students, excellent botanical gardens, laboratories, and a fine library. Several bridges cross the canals. The streets are substantially paved and improved by gas and electric lighting, a number of fine monuments, and an extensive system of rapid transit. Among the manufactures are tobacco products, furniture, salt, metalware, carpets, chemicals, textiles, clothing, cordage, and musical instruments. It has an extensive market in live stock, fruits, grain, and dairy products. Utrecht ranks as one of the oldest cities of the Netherlands and dates from the period of Roman occupation. The United Netherland Republic was formed at Utrecht in 1579 and the peace of Utrecht was signed here in 1713. Population, 1906, 114,692; in 1920, 140,189.

UTRECHT, Treaty of, a celebrated peace treaty signed at Utrecht, in the Netherlands, on April 11, 1713, by which the ten years' war of the Spanish succession was concluded. The treaty was agreed to by Prussia, Savoy, England, Portugal, France, and other interested nations. Among the important features of the treaty are that the Hanoverian succession in England was recognized, that the King of Prussia was recognized in his title and received a part of Spanish Guelderland, that Newfoundland, Nova Scotia, Hudson Bay Territory, and several other French possessions were ceded to England, that Nice and Savoy were restored to the Duke of Savoy, who received the title of king and became presumptive heir to the Spanish throne, and that France stipulated not to unite the crowns of France and Spain. The treaty recognized Neuchâtel as a possession of Switzerland and several other minor conditions were included.

UZ, a region mentioned in the Old Testament as the scene of the story of Job. It appears that Job resided in the country east of Palestine, near Edom, where he was visited by his friends Eliphaz the Temanite, Bildad, Zophar, and Elihu.

UZBEKS, Usbeks, or **Usbegs,** the name of a people of Turkestan. They belong to the Turkish branch of the Turanian race. Writers class them as the most progressive inhabitants of Turkestan, where they have their chief seats of influence at Bokhara, Khiva, and Khokan. Though some are nomadic, most of them have fixed homes and engage in agricultural and commercial pursuits. In religion they are rigid Mohammedans. They dwelt on the Jaxartes up to the 14th century, when they moved westward. The Russians place their number at 1,500,000.